Laboratory to Test Insulation in Use At Westinghouse

MANSFIELD — A new "quality control" laboratory to test and check the insulation efficiency of electric refrigerators has just been completed by Westinghouse Electric & Mfg. Co. at its Mansfield works.

Temperature in the test room is maintained at 80° F., within a tolerance of one-half degree, plus or minus. Ralph Bisbee, chief inspector responsible for the room's construction and maintenance, says the laboratory is the most accurate of its kind used to determine insulating efficiency and performance tests.

Quality and efficiency of insulation are checked by the "heat leak," measuring and recording on delicate and sensitive instruments. Amount of heat passing through the refrigerator per hour per degree F., difference between interior and exterior refrigerator temperature recordings, is the heat-leak factor. This is compared to a standard, and any difference in the reading is checked at once.

To obtain absolute accuracy on these heat leakage tests, an even heat source within the refrigerator must be obtained as well as a constant temperature outside.

The inside temperature is maintained by a heat source direct connected to the line current, with a maintained voltage of plus or minus one volt. The input is measured by a specially calibrated kilowatt-hour meter, made for this particular installation.

Constant temperature in the laboratory is maintained by highly efficient wall, ceiling and floor insulation, and by elimination of unnecessary interruptions while the test is being performed.

To prevent fluctuation in room temperature the air is heated and cooled almost simultaneously, and is kept in constant circulation by means of exhaust and ventilating ducts. Fluctuation is recorded on a Bristol recording thermometer.

Wagman Heads Krich Merchandising

NEWARK—Dave Wagman was recently appointed merchandising manager of the sales department of Krich-Radisco, Inc., Kelvinator and RCA-Victor distributor.

He will assist Paul R. Krich, vice president in charge of sales, and Earl Pullen, sales manager of the RCA-Victor division, in the merchandising of all lines, and will act as counselor to dealers.

Associated with the Krich organization for several years, Mr. Wagman has been merchandising manager for Kelvinator products exclusively. His new office was created to provide closer contact with all dealers affiliated with Krich-Radisco.

Distributor Fetes Norge Viking Chieftains

NEWARK—Members of the Norge Viking Chieftain club were guests at a dinner recently given by B. & O. Radio Co. at Robert Treat hotel.

Prizes were awarded members scoring a required number of points on Norge sales. Benjamin J. Oppenheim, president of the company, was toastmaster.

Richardson Joins St. Louis Graybar Electric Co.

ST. LOUIS—Howard E. Richardson, recently sales manager of Taylor Electric Co., Milwaukee, has been appointed merchandise manager of Graybar Electric Co., Kelvinator distributor, to succeed Charles Armstrong, who resigned in May because of poor health.

New Haven Dealership Adds New Appliance Lines

NEW HAVEN, Conn.—Ideal Appliance Co. has been appointed dealer for Norge refrigerators and washers, Westinghouse appliances, and Zenith radios. N. Brunetti is manager.

New Crosley Dealership Opened in Tucson

TUCSON, Ariz.—Handling Crosley home appliances, L. C. Neil Appliance Co. has opened a store at 427 N. Fourth Ave.

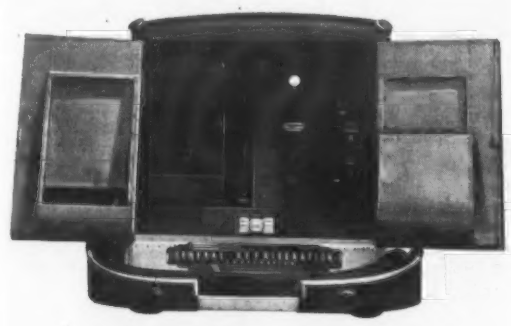
GR

AIR CONDITIONS THE WORLD'S AIRLINERS

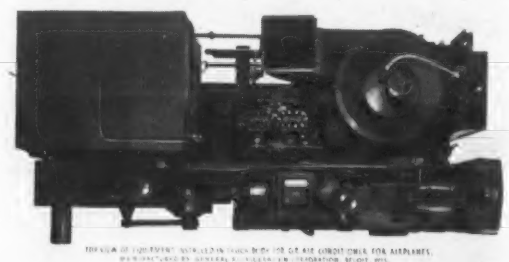
American Airlines Flagship being Cooled by G-R AIR CONDITIONER at the Chicago Municipal Airport

Airliner and Streamliner companies all come to General Refrigeration Corporation when they have a difficult comfort cooling problem to be solved. And G-R Air Conditioning engineers always have proved equal to the occasion. The world's airliners and crack trains have been made more comfortable by G-R Air Conditioning. If you want to handle a line that has a well established reputation for meeting the most difficult comfort cooling requirements, satisfactorily and economically, write for information covering the G-R line and distribution plan, today!

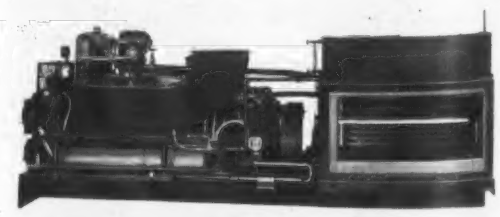
Back view of G-R AIR CONDITIONER



Top view of G-R AIR CONDITIONER



Side view of G-R AIR CONDITIONER



G-R AIRLINER AIR CONDITIONERS Made for Several of the World's Outstanding Air Transportation Lines

GENERAL REFRIGERATION CORPORATION

Dept. AF-7, Beloit, Wisconsin, U. S. A.

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DETROIT

THE NEWSPAPER OF THE INDUSTRY

AIR CONDITIONING AND

WRITTEN TO BE READ ON ARRIVAL

REFRIGERATION NEWS

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May Orders for Cooling Systems Are $6,472,804

Increase of 40% Over Month Last Year; 1% Under April

WASHINGTON, D. C. — Orders booked for air-conditioning systems and equipment during May amounted to $6,472,804, an increase of approximately 40% over the $4,650,681 reported during the same month last year, according to figures compiled by Director William L. Austin of the bureau of the census, Department of Commerce.

May orders lacked but 1% of equaling the mark of $6,538,431 established in the preceding month.

The statistics, which cover reports by 125 manufacturers, are divided into three groups, the first covering air-conditioning systems for cooling, air washers, filters, and humidifiers; the second covering fans, and the third, unit heaters.

Orders in the air-conditioning group only during the month of May totaled $3,598,802, an increase of about 29% over the $2,779,564 reported for the month last year. Leading in the group were orders for human comfort systems of the central-station type, which totaled $1,104,603, unitary systems of the self-contained and not self-contained type following with orders totaling $835,541 and $832,975, respectively.

Industrial air-conditioning systems reported orders totaling $136,742 during the month, while systems sold to contractors for separate installation showed $364,145 in orders for the period.

Air washer orders during May totaled $119,987, air filters $38,673, and humidifiers $166,136.

Orders in the fan group totaled $2,108,469 during the month, while unit heater group orders were reported at $765,533.

Chicago Cooling Sales 341 in Six Months

CHICAGO — Installations of air-conditioning equipment in Chicago during the first six months of this year set a new high record, both in number of installations and capacity, according to statistics compiled by the Commonwealth Edison Co.

Through June, installations placed in operation or contracted for in the Chicago territory totaled 341 compared with 245 in the corresponding period of last year, an increase of 39%. Capacity of installations in the first six months of the year aggregated 10,042 hp., an increase of 45% over the 5,810 hp. in the same months of last year.

Installations in June also set a new high record, 83 contracts being

(Concluded on Page 24, Column 1)

23% Gain in Baltimore Jobs in 4 Months

By W. H. Long

BALTIMORE — Commercial and industrial air-conditioning installations made and contracted for here during the first four months of this year show a gain of 23.6% over the total horsepower of all installations made in 1936, according to figures of the Air Conditioning Bureau of Consolidated Gas Electric Light & Power Co.

A total of 36 installations, exclusive of residential conditioning jobs and self-contained room coolers, total 2,118 hp., as compared with 1,632½ hp. for all last year. The 1936 figure including 10 residential installations rated at 37 hp. and 33 room coolers totaling 40 hp.

(Concluded on Page 14, Column 3)

Bendix Setup for Appliance Field Is Announced

DETROIT—With the introduction of a new type automatic laundry by Bendix Home Appliances, Inc., newly formed corporation with headquarters here, a name prominently identified with the automotive and aviation industries enters the electrical appliance merchandising field.

Production of electric washing machines of a radical design will begin in September.

Heading the corporation as president is Don O. Scott, known in automotive circles for the introduction and development of the Lockheed Hydraulic brake.

J. S. "Jud" Sayre, vice president in charge of sales, was formerly sales manager of Kelvinator Corp., later manager of the household sales division of Montgomery Ward, and more recently, assistant to the president of RCA Mfg. Co. Otto C. Lang, formerly vice president of Hydraulic Brake Co. is Bendix vice president.

Vincent Bendix is interested and active in the affairs of the company.

Executive and sales headquarters of the new corporation will be in Detroit. Manufacturing will be done in South Bend, Ind. The firm plans to manufacture a complete line of major household appliances.

Bendix Aviation Corp. is said to have a 25% stock interest in Bendix Home Appliances, Inc.

Brooke, Smith, French & Dorrance, Inc., New York City division of

(Concluded on Page 24, Column 4)

Anti-Utility Legislation Killed in Connecticut

HARTFORD, Conn. — An anti-merchandising bill which would have prohibited gas and electric appliance sales by Connecticut utility companies died in the judiciary committee of the state legislature with the end of the recent legislative session. The bill was not even accorded the formality of a report to the upper house.

Sentiment against the bill increased with each hearing, and it faced

(Concluded on Page 24, Column 3)

Syracuse Plant Bought, Carrier Plans for Move

Manufacturing Operations Will Be Centralized At New Location

NEWARK — Following announcement last week by L. R. Boulware, vice president, that Carrier Corp. had purchased the former Franklin Automobile Co. plant at Syracuse, N. Y. and would transfer 80% of its activities there within a year, W. A. Bowe, advertising manager, stated that the company had abandoned its policy of decentralized manufacture and that plans call for eventual exclusive operation at the new Syracuse plant.

In addition to its plant and offices at 850 Frelinghuysen Ave. here, Carrier Corp. is at present manufacturing at New Brunswick, N. J., and at Allentown and Bridgeport, Pa. Mr. Bowe declared that operations at the four points from now on would be curtailed gradually.

Reports here state that the former Franklin plant in Syracuse was bid in at public auction there July 2 by

(Concluded on Page 24, Column 2)

Inland Plans Eastern Service Plant

DAYTON — Construction of an eastern service plant by Inland Mfg. division of General Motors Corp. to service eastern and export assembly plants of the company will be started within the next few weeks, Wallace S. Whittaker, general manager, has announced.

The plant will be of modern factory building design, and will include approximately 100,000 sq. ft. Designed by Albert Kahn, Inc., Detroit, it will be located in a rural section of New Jersey in Clark township, five miles from Linden, where General Motors' newest and largest assembly plant recently went into operation.

Functioning strictly as a branch

(Concluded on Page 24, Column 2)

A Sailor Wins a Kelvin Home

Prof. Quiz (right), question-and-answer man of the radio, informs Lieut. Richard F. Armknecht of the U. S. Navy, who is stationed at the New York navy yard, that he is first prize winner in the national Kelvin Home "missing word" contest. Announcer Arthur Godfrey is in the center. The prize, one of more than a thousand distributed by Nash-Kelvinator Corp. to winners in the contest, is a six-room Kelvin Home. More than 140,000 people entered the contest from all parts of the United States. Mr. Armknecht's home will be erected in Cambridge, Mass.

Grunow's Directors Elect Harry Alter To Presidency

HARRY ALTER

CHICAGO—William C. Grunow, for the past five years president of General Household Utilities Co., has been elected to the newly created post of chairman of the firm's board of directors, and Harry Alter, General Household Utilities' sales manager since February, has been elected president of the company, it was announced July 7 by the company's board of directors at the conclusion of its regular monthly meeting.

Other officers elected were: A. Dangler, Jr., vice president and treasurer; and T. E. Pegram, secretary. Mr. Dangler previously was associated with Trundle Engineering Co., Cleveland.

Immediately after his election to the presidency, Mr. Alter announced appointment of Sidney L. Arneson as assistant sales manager. Mr. Arneson has been identified with Mr. Grunow in various capacities for the past 15 years. In his new position he will assist Mr. Alter in directing sales of Grunow radios and refrigerators.

Harry Alter, pioneer radio distributor in Chicago, and one of the three brothers who have made Harry Alter Co. one of the best-known appliance distributors and parts jobbers in the country, first became associated with Mr. Grunow in 1924, when his firm became distributor for Grunow products. Harry Alter has been identified with the appliance end of the business, while Irving has operated the parts supply division.

Since that time, Mr. Alter, as head of one of the largest Grunow wholesale outlets, always has taken an active part in the manufacturing and sales policies of the Grunow organization.

Mr. Grunow's efforts to induce Mr. Alter to assume some part in the company's active management culminated last February in the appointment of Mr. Alter as sales manager of General Household Utilities Co.

In their new positions, Mr. Alter will concentrate his efforts on direction of the company's sales policies, leaving Mr. Grunow free to work out problems of product development and production.

3 District Representatives Appointed by Mills

CHICAGO—Mills Novelty Co.'s commercial refrigeration division has appointed W. A. Smith district representative in eastern Pennsylvania, eastern New York, New Jersey, and Delaware; R. R. Seddon sales representative in the New England states; and A. A. Haney as sales representative in the southwestern territory.

Mr. Smith was formerly Chicago manager of the refrigeration and heating division for Borg-Warner service parts. Mr. Seddon, who formerly operated his own company in Boston, has been a field engineer with Mills for the past two years. Mr. Haney was also a field engineer with the firm, before which he managed his own refrigeration company in Ft. Worth.

Copeland Wins Point on Hiring; Plant Reopened

Production Is Resumed At Once as Workers Agree to Terms

DETROIT, July 13—The plant of Copeland Refrigerator Corp., closed by the management approximately two weeks ago because of "unreasonable" demands made by employes, was reopened and in operation today (Tuesday).

All employes working at the time of the shutdown were notified to report for work immediately.

Shipments of Copeland refrigerators and other products made by the company will be resumed at once, according to company officials, and a heavy production schedule will be maintained until back orders, which accumulated during the shutdown period, are filled.

Reopening of the plant came after a "mutually satisfactory" agreement had been reached between Copeland officials and union (Mechanics' Educational Society of America) representatives of the plant's employes.

Prime factors in this agreement dealt with wages, hours, and the right of the company to determine the efficiency or inefficiency of employes.

Considerable significance was attached to this last-named part of the agreement, since it was said that the virtual demand of union employes for control of the hiring and dismissal of plant employes was responsible for the management's closing the plant.

Pennsylvania Law Protects Prices

HARRISBURG, Pa.—Pennsylvania has joined the rapidly growing list of states with fair trade laws prohibiting sales of merchandise below cost. Gov. George H. Earle has signed a bill authorizing district attorneys to prosecute complaints against dealers. A maximum penalty of $500 is provided for violation of the act.

The law exempts sales of perishable goods, legitimate clearance sales, and sales to meet competition in comparable goods not sold below cost.

Philadelphia Distributors Plan to Draw Up Code

PHILADELPHIA — In an effort to establish a uniform fair trade practice agreement governing the merchandising of electric refrigerators and radios, and thus protect retailers by the stabilization of established retail prices, distributor members of the Electrical Association of Philadelphia recently adopted a resolution and appointed a committee to formulate such a code under the fair trade act of Pennsylvania.

Dealer members of the association were informed of the action being taken in a letter from George R. Conover, managing director of the association.

Air Conditioner Exports Show Big Increase

WASHINGTON, D. C.—Exports of air-conditioning equipment including portable conditioning units to foreign markets during the month of May amounted to $170,163, as against the $79,342 volume for that month in 1936, according to figures released by the Machinery Division, Department of Commerce.

Canadian Association In Annual Meeting

BANFF, Alberta, Canada—Devoting a major portion of their time to merchandising and appliance sales problems, 250 members of the Canadian Electrical Association held their seventeenth annual convention here recently.

Speakers at the four-day conclave included:

A. C. Abbott; W. Anderson, Calgary Water Power Co.; David M. Debard, Edison Electric Institute; Samuel G. Hibben, director of applied lighting, Westinghouse Lamp Co., Bloomfield, N. J.; J. Lightbody, chairman of the association's advertising committee.

J. C. McDonald, British Columbia comptroller of water rights; W. F. Mainguy, chairman of the lighting committee; W. C. Mainwaring, chairman of the appliance committee; W. E. Potter, Portland, Ore.; and J. E. Rogers, vice president of the Washington Power Co., Spokane.

West Penn May Sales Best in History

PITTSBURGH — Sales of major appliances during the month of May by companies in the West Penn Power Co. system exceeded those for that month in 1936 and were the highest May sales in the company's history, reports show.

Topping the list of best sellers were electric water heaters, with a 228% increase over the month's 1936 sales. Electric range sales were 220% greater than those in the preceding May, and ironer sales were 36% greater. Frigidaire sales made by the power company were 25% ahead of those for the month last year.

Armstrong Announces Personnel Changes

LANCASTER, Pa.—In a series of three personnel changes recently announced by Armstrong Cork Co., George W. Kittridge was appointed assistant personnel manager here.

Joining the Armstrong company in 1931 as a member of the personnel department, Mr. Kittridge was transferred to the Beaver Falls (Pa.) factory in 1932 as production superintendent, and since 1934 has been assistant superintendent there.

Oscar G. Wheat, who has served as assistant general superintendent of the factory at South Braintree, Mass., has been appointed to succeed Mr. Kittridge as assistant general superintendent at Beaver Falls.

H. G. Jones has been appointed assistant general superintendent at the South Braintree plant.

Boston Bureau Plans Outing on Sept. 24

BOSTON—Air Conditioning Bureau of Boston will hold its fourth annual outing Sept. 24 at New Ocean House, Swampscott. Don Edwards is chairman of the outing committee, Rudolph Sommers is vice chairman.

The general committee consists of Julius Daniels, chairman, and J. F. G. Miller, D. S. Boyden, Prof. James Holt, J. E. Gould, M. D. Engle, James P. Moyer, Walter L. Fleisher, and F. A. Weisenbach.

These men represent the bureau and the following organizations, which will participate in the outing:

Air Conditioning Manufacturers' Association, American Society of Heating & Ventilating Engineers, American Society of Refrigerating Engineers, National Association of Practical Refrigerating Engineers, Boston Oil Burner Associates, National District Heating Association, and the New England Building Officials Conference.

Big Increase Reported in Canadian G-E Sales

TORONTO, Ontario, Canada—Substantial increase in the sale of household appliances by Canadian General Electric Co. this year as compared to 1936 has been reported by J. S. Keenan, operating and merchandising manager.

The company's electrical business has improved steadily since 1933, according to Mr. Keenan, but it still amounts to only half of the 1929 volume.

Jewett Gets Contract For N. Y. Hospital

NEW YORK CITY—Contract for all refrigeration in the new Chronic Disease hospital on Welfare Island has been awarded to the Jewett Refrigerator Co., Inc. of Buffalo, the New York City department of hospitals announced last week.

The hospital, when complete, will cost more than $5,000,000, of which the refrigeration equipment will total approximately $100,000, it was said.

Jewett's contract calls for 105 special installations of storage, diet kitchen, service, cracked ice, service kitchen, laboratory, and utility room refrigerators, and includes a 30-body mortuary refrigerator.

Construction on the contract, said to be the largest awarded for any hospital in the last five years, is to begin at once, with installation of equipment to be completed during 1938.

Jewett is also furnishing refrigeration equipment for the staff house of the Metropolitan hospital, and a number of kitchen refrigerators in the nurses' homes. Both are part of the Walfare Island hospitalization project.

Boe Is Westinghouse Commercial Head

EAST PITTSBURGH—H. F. Boe has been appointed commercial manager of Westinghouse Electric & Mfg. Co., announces Vice President N. G. Symonds.

In addition to being responsible for the sale of Westinghouse products in the eastern district, Mr. Boe will now direct the commercial activities of the apparatus division.

He will have headquarters in Pittsburgh and New York City.

A native of Mansfield, Mr. Boe has been associated with Westinghouse since 1900. He studied engineering at the Casino Institute of Technology and at Carnegie Institute of Technology. For the first 14 years of his career he was active in East Pittsburgh headquarters works.

In 1918 he entered sales work at Rochester, N. Y., and went to Buffalo as district industrial division manager in 1922. In 1935 he was transferred to New York City, where he became eastern district manager, the position he still retains with added duties of his new post.

New Norge Distributor In Jacksonville, Fla.

JACKSONVILLE, Fla. — Norge Jacksonville Co. has entered business here as distributor of the complete line of Norge products, according to an announcement by Oscar H. Landgren, general manager of the company.

J. C. Mackoy, formerly a dealer in Portsmouth, Ohio, is sales manager of the company.

Alabama Power Users Buy 3,065 Appliances

BIRMINGHAM, Ala.—Thirty-seven carloads of electric ranges and water heaters—3,065 units in all—were sold to customers on the Alabama Power Co.'s lines during the months of May and June. Approximately half of this total was sales made by company salesmen; dealers throughout the state accounted for the other half.

Topping the list for high sales during the two-month activity were company salesmen G. L. Casey, Birmingham; D. L. Satterfield, Tuscaloosa; W. C. Singleton, Mobile; F. C. Fitts, Huntsville; T. A. Bowling, Montgomery. Leading dealers were Frank Wilson, Huntsville, and George Walters, Eufaula.

Nema Opens Campaign In Rural Papers

NEW YORK CITY—A campaign to increase use of electrical appliances among farmers has been launched by the rural electrification bureau of National Electrical Manufacturers Association through the medium of rural weekly newspapers.

Letters have been sent to editors of 800 such papers in 23 states having the lowest percentages of electrified farms and the highest percentages of farm buildings valued at $500 or more. The letters ask the editors if they are interested in publishing short contributed articles telling of specific savings reported by farmers using electrical equipment.

Trade periodicals, 4-H clubs, and the National Farm and Home Hour also have been proposed as mediums for this campaign.

G-E Planning Exhibit At San Francisco

SAN FRANCISCO—General Electric has signed a contract with the Golden Gate International Exposition of 1939 to exhibit its "House of Magic" in the Palace of Electricity and Communications.

The exhibit palace of the electrical industry will be approximately 200 x 447 feet in dimensions. G-E previously subscribed $75,000 in the $7,500,000 Exposition underwriting campaign. Its exhibit will increase its outlay to $333,000.

A. V. Thompson is in charge of the firm's Exposition participation.

McCoy Named President Of Wyoming League

SHERIDAN, Wyo.—James McCoy, Jr., was named president of the Sheridan unit of the Rocky Mountain Electrical League, organized at a meeting of dealers, utility representatives, and contractors here last week. Homer Gebo was named secretary-treasurer.

Every woman knows that unprotected iron or steel will rust. She knows that the unavoidable humidity in her kitchen will soon set up corrosion and eventually disfigure the fine finishes on kitchen equipment.

The experiences of neighbors and friends, and national advertising have educated her to the value of Bonderizing as protection against rust. She knows that it gives paint better adhesion, so that it will not chip nor peel off. She is informed as to why rust will not spread around scratch or dent on the Bonderized metal. She wants this sort of protection for the equipment she buys.

If the refrigerator you sell is Bonderized, you can use this feature with telling results. After demonstrating its outstanding mechanical features, its roomy interior, its beauty of design—then clinch the sale with the fact that the cabinet is protected from rust by Bonderizing.

In the battle for business, use all your weapons. Bonderizing is a powerful factor in building up your sales earnings.

PARKER RUST-PROOF COMPANY • 2197 E. MILWAUKEE AVE. • DETROIT, MICHIGAN

Ask for These Books

For more than 22 years, this company has devoted its entire time, talent and energy to the improvement of rust-proofing methods. New books describing the Parker Processes are available to manufacturers and technical men. Send for your copies.

PARKER *Processes* CONQUER RUST
BONDERIZING · PARKERIZING

BRIDGEPORT *Knows* BELLOWS

Add this corps of specially trained, highly experienced engineers to your staff . . . and without cost to your company!

They know bellows' characteristic and application possibilities . . . because they have specialized on this one subject . . . are backed by years of experience and research.

They will study your problem with you . . . tell you quickly whether a bellows' assembly will do the job or not . . . the *kind* of bellows you need and how to apply it to guarantee its successful service.

Furthermore, they will supply that bellows in any quantity you desire with positive assurance that each will measure up to the same rigid standards of quality and performance, with close adherence to the specific dimensional limits and physical characteristics desired. Write for Bulletin 37. Bridgeport Thermostat Co., Inc., Bridgeport, Conn.

You'll make more money with C. I. T.

C. I. T. BUSINESS BUILDER

The localized national finance service

JULY Prepared by C. I. T. Corporation, unit of Commercial Investment Trust Corporation, capital and surplus over $100,000,000 1937

Dealers Find C. I. T. A Boon To Business As Drive for Mid-Summer Sales Gets Under Way

Refrigerators and Other Appliances . . . Radio . . . Automatic Heating . . . All Helped by Purchase Plans Made Available Through America's Largest Independent Finance Company . . . the Company of "Friendly Service"

Survey Reveals Big Summer Interest in Radio

A recent nationwide survey indicated that today there is no such thing as a summer slump in radio listener interest. Accordingly, summer programs are being improved. Broadcast volume and program quality are going steadily up, with many of the big winter shows continuing through the warm weather. It is figured that there will be 34,000,000 sets in active use this July.

Recognition of the changed situation as regards summer interest in radio is seen in the sales plans of the radio manufacturers. The new models were out "bright and early" this year. As in the automobile field, these new models coming well in advance of the traditional heavy buying season create a better situation for the dealer, as well as for the manufacturer.

Limited Recourse Helps Dealers To Keep Their Capital Fluid

One of the outstanding recent developments in appliance financing is the Limited Recourse Retail Finance Plan offered through C.I.T. *for your benefit.* Under this plan the dealer's endorsement of paper becomes without recourse after the first four monthly instalments on a household appliance have been paid by the purchaser. Yet it operates without cost to the dealer.

With the increased summer activity this year it becomes doubly important for the retailer to have his capital free for sales promotion. When relieved of contingent liability by Limited Recourse, dealers may do a larger volume of business, building up their capital while reducing their liabilities. There is no hold-back to tie up part of their profit. They receive 100% cash at once. Capital remains fluid; current assets increase and are not frozen beyond immediate reach. Ask your C.I.T. branch for complete details.

Show A Complete Line With Moderate Down Payment

The C.I.T. Floor Plan enables you to stock a complete line without having to dig into working capital. Payment extends over three months, and the cash outlay is only a small percentage of the total wholesale invoice price. The Floor Plan is available for stocking many appliances, such as ranges, room coolers, oil burners and stokers. Ask your distributor or C.I.T. local office now, and enjoy the advantage of a complete line for your prospects to examine.

Both Consumer and Dealer Appreciate C.I.T. Credit Service

For nearly 30 years C.I.T. has been investigating the credit of budget buyers. A system has developed which is unrivaled for accuracy and speed.

C.I.T. credit investigators have been trained to gather the facts about a buyer's credit standing rapidly, yet tactfully.

* * *

National Advertising Makes New Friends for C.I.T.

Full-page advertisements from time to time in The Saturday Evening Post, Collier's, and Time promote "consumer good-will." This advertising keeps the name of C.I.T. before your customers. By explaining the principles of instalment buying in everyday language, it makes new friends for this form of social progress. Through national advertising, C.I.T. is becoming a household synonym for reliable budget-buying.

HAVE YOU THOUGHT OF THIS?

—that the chances are your best prospects for refrigerators, automatic heating units and air conditioners are customers to whom you have already sold some other household appliance on the C.I.T. Budget Plan.

—that these customers are preferred risks. They have established their credit standing and their ability to pay. Among these names on your books you'll find a wealth of business if you cultivate it.

—that the shorter maturity you place on a refrigerator or other instalment contract the sooner the customer will liquidate his obligation and again become your prospect for another appliance.

—that the clearer and more complete your report is to C.I.T. on the customer's credit the better and faster service C.I.T. can give you and your customer.

"Summer Plan" For Automatic Heating

The automatic heating field, authorities agree, is heading for its biggest year. And summer is the time when business is done! Smart dealers are not content to wait until fall. Oil burners, furnace stokers, gas furnaces, year-round air conditioning units, water heaters and other utility devices of similar character can be installed most economically during the summer months. Skilled labor is available. Working days are not interrupted by bad weather or family demands on the present water and fuel systems, etc.

To meet this situation, the C.I.T. dealer makes use of the C.I.T. Summer Plan. Under this plan, *the consumer pays no instalments until October.* Think what this means! The installation is put in, tested, and proved ready to work before the first regular monthly payment is due. Starting in the fall, a convenient, easy-to-understand system of monthly payments takes care of the unpaid balance. The purchaser knows just what this accommodation is costing him. You, the dealer, get your money promptly. Your profit is sure.

Present and Former Customers Offer Opportunity

A sales aid which dealers find valuable in summer is the drive on former and present customers. Do you realize that your list of customers whose credit has been investigated and found satisfactory by C.I.T. is a "preferred" list? Make use of it! Give every name on your records a call or letter telling them about the new merchandise you have to offer. If it was a refrigerator they bought, suggest a radio or other purchase. If they bought their radio from you, suggest something else you think they need.

Put C.I.T. Display Material To Work

Another proved way to boost sales is to give the familiar red C.I.T. poster prominent display. To millions it carries the assurance of the best in time-buying service. The poster is available with an easel back for counter use, with adhesive front for inside of window, and in miniature. If you haven't received a sufficient supply, just ask your local C.I.T. office.

HOW C. I. T. SERVICE MADE NEW FRIENDS FOR DEALER BROWN—*by Westcott*

I WISH WE COULD HAVE THAT REFRIGERATOR FOR THE SUMMER COTTAGE
IT CERTAINLY WOULD BE MORE CONVENIENT- BUT WE NEVER BOUGHT ANYTHING LIKE THAT HERE
THEY HAVE THE C.I.T. BUDGET PLAN. THAT'S WHAT WE'RE USING THROUGH OUR DEALER AT HOME
WELL, LET'S GO IN AND LOOK AT IT
JUST WHAT YOU NEED FOR THE SUMMER COTTAGE
WE NOTICED THAT C.I.T. SIGN IN THE WINDOW
YES, WE'VE FINANCED THROUGH THEM BEFORE
THEN IT WILL BE NO TROUBLE AT ALL TO GET A CREDIT DECISION QUICKLY. THE C.I.T. SERVICE IS NATIONWIDE
SEEING THAT C.I.T. BUDGET PLAN SIGN IN THE WINDOW MADE US FEEL AT HOME
THANK GOODNESS WE GOT THAT REFRIGERATOR. THIS MELON IS REALLY COLD
C.I.T. CERTAINLY MAKES IT EASY AND CONVENIENT TO BUY THINGS
Dealer Brown Talking to You
I find it pays to let people know I finance through C.I.T. It's a wonderful sales help to have millions of prospects who feel friendly toward and acquainted with your finance company.

The Philosophy of "Dealer Dan"

Someone told me the other day that instalment buying is making a great hit in France. "Paiements deferes" is their name for it. The principle of paying for conveniences out of current earnings must appeal to the thrifty French.

Buying an automatic heater out of season has its advantages, but no one likes to pay for something until they are actually using it. That's why the C.I.T. Summer Plan packs a punch. Summer installation with fall instalments makes a good salespoint.

C.I.T.'s 165 Branch Offices Are Complete Operating Units

There are 165 C.I.T. branch offices —one in every important trading center in the United States. . . . There's sure to be a C.I.T. office near you. Get acquainted with it!

C. I. T. CORPORATION • NEW YORK • CHICAGO • SAN FRANCISCO
ADVERTISEMENT

Trading Stamps Bill Stopped by Senate in Wisconsin

MILWAUKEE—A bill to prohibit the issuance of trading stamps or other tokens or premiums on merchandise on which the retail price was fixed under the Wisconsin fair trade act was defeated recently in the Wisconsin senate, after it had been passed by the assembly.

Sponsors of the bill, which included practically all retail merchants in the state not using trading stamps, and the Wisconsin Radio, Refrigeration & Appliance Association, had contended that they were at a disadvantage on fixed price merchandise on which the price amounted to more than $15 or $20.

Contest over the legislation became quite bitter. Sponsors of the bill, whose strong efforts brought about its passage in the assembly, were surprised at its defeat in the senate.

2 New Distributors Named by Apex

CLEVELAND — Appointment of two new distributors to handle Apex electrical appliances was made recently by Charles W. Smith, general manager of Apex Electrical Mfg. Co.

The Huntington Wholesale Furniture Co., Huntington, W. Va., will handle distribution in the states of Virginia, West Virginia, and Ohio; J. W. Holman & Co., Middletown, Ohio, is new Apex representative in the Ohio counties of Butler, Warren, and Clinton.

New Briggs Refrigerator Dealer Named in Ohio

BELLEFONTAINE, Ohio — The Logan County Maytag Co. here has been named dealer in Briggs refrigerators, manufactured by Johnson Motors. The firm also handles Kelvinator, Stewart-Warner and Electrolux.

Middle Income Families Are Best Prospects For Refrigeration, N.Y. Times Survey Shows

NEW YORK CITY—The importance of the present-day market for electric refrigeration in high-priced homes as compared to the market to be found in low and middle-priced homes is indicated by results of a telephone survey made by the New York Times of 2,606 single-family homes in Brooklyn, Queens, and immediate suburbs of New York City.

The survey was divided into three groups according to the following valuation of homes: high, over $10,000; medium, from $5,000 to $10,000; low, under $5,000. Rented homes with refrigerators supplied, and families who bought second-hand homes with refrigerators installed, were excluded from the survey.

After determining how many homes were equipped with electric refrigeration, the survey went on to classify these refrigerators (both original and replacements) as to age.

The completed survey showed that the number of homes without electric refrigeration was much greater in the medium and low classifications than in the high division, which might seem to indicate that the best market for new refrigerators lies in the medium and low income areas.

Closer analysis of the survey, however, reveals that the number of potential sales in the high-priced homes areas outweighs the number of potential purchasers in low and medium districts.

Determining factor in this paradoxical situation is the potent replacement market.

Projecting the percentages obtained in the survey against the total number of owned homes in the area, it is found that although the number of families without electric refrigeration increases from 10.4% in high areas to 25% in medium, and 45.7% in low districts, the high districts show a potential replacement market of 12,161 units compared to 4,060 units for the medium-low areas.

Further indication of the fertility of the replacement market in high areas is supplied by the fact that of the 53 refrigerators purchased by the 703 surveyed families during the past year, 26, or almost 59%, were replacements of old refrigerators.

Of the 32 refrigerators purchased by the 516 surveyed families in the medium-priced homes areas during the past year, only six, or less than 19%, were replacements. In low areas, only five, or less than 13% of refrigerators purchased last year by the 527 families surveyed fell in the replacement class.

Again projecting the survey results against the total number of homes in the surveyed area, it is estimated that 125,187 homes in high areas are equipped with electric refrigerators, while only 101,105 of the 139,054 medium and low homes have electric refrigeration. But 15.1% of refrigerators owned in high areas and only 5.1% of refrigerators owned in low areas are replacements.

By computing the number of homes which were without electric refrigeration a year ago, and the number of boxes purchased within the last year, the survey determined that the potential market for the coming year amounted to 3,923 units in the high areas and 6,072 units in the low and medium regions.

But adding to this the potential replacement market already established at 12,161 units in high districts, and 4,060 in low and medium territory, the survey shows the total potential market for electric refrigerators in the surveyed territory to be 16,084 in high areas and 10,132 in low areas, or a grand total of 26,216 units.

McDavid & Co. Leases Additional Space

BIRMINGHAM, Ala. — Organized in 1934 with five employes, R. P. McDavid & Co., Inc., Alabama Kelvinator distributor, today employs 65 people and does a monthly volume of business equal to its entire year's business three years ago, reports B. C. McCoy, Jr., promotion manager.

At the outset, the firm occupied the ground floor of a four-story building 25 x 140 feet. Today the company not only occupies the entire four floors, but also has leased another building of equal size next door, Mr. McCoy says. Storage space, formerly handled in the original building, has been transferred to two additional warehouses, he adds.

2,500 Guests Attend Sampson Jamboree

CHICAGO—Sampson Electric Co., Chicago Norge distributor, celebrated its annual June jamboree with afternoon and evening meetings June 28 in the grand ballroom of the Stevens hotel.

Fifteen hundred dealers, salesmen, and their friends attended the afternoon meeting, which was devoted to speeches by factory heads and guests, and about 2,500 guests were present at the banquet that evening, climax of the celebration.

Norge speakers at the afternoon meeting included R. S. Beale, sales manager of the heating and air-conditioning division; E. R. Bridge, washer and ironer division sales manager; R. E. Densmore, general field manager; N. M. Forsythe, range specialist; E. R. Lovegren, regional manager; and W. C. Rowles, commercial division sales manager.

Guest speakers were G. E. Stedman, vice president in charge of market planning of Cramer-Krasselt advertising agency, Milwaukee; A. E. Bottenfield, president of Norge Co. of Missouri; and David Burke, president of Radio Distributing Co., Detroit distributor.

Highlighting the banquet was the dessert course, when the lights were dimmed and waiters carried in electrically lighted ice molds, on which were perched molded ice cream in the shape of Norge refrigerators and ranges. Speakers at the evening celebration were C. S. Davis, president of Borg-Warner Corp., and Gus Schallberg, Borg-Warner's legal counsel.

Following a toast to John Knapp, Norge vice president in charge of sales, who was unable to be present, a two-hour floor show was presented. "Pete" Sampson, president of Sampson Electric Co., supervised both afternoon and evening meetings. He was assisted by Ben Greenhouse.

C.I.T. Corp. Opens Office In Decatur, Ala.

DECATUR, Ala.—C.I.T. Corp. recently opened a new office here in the Dix building, with A. A. Almand, connected with the company for several years, as manager. Decision to open the new branch is occasioned by the marked increase in business activity throughout northern Alabama, according to O. A. Miller, C.I.T.'s territorial service supervisor in this state.

New Norge & Maytag Store Opened in Weiser, Idaho

WEISER, Idaho—A new store to handle Norge and Maytag appliances has been opened here by Bob Demery and Art Darby, operators of Demery & Darby Appliance Store in Ontario, Idaho. A service department is being operated in connection with the new dealership.

Mr. Demery will remain in charge of the Ontario store, while Mr. Darby will make his headquarters here.

WOLVERINE COPPER TUBING

EASY *to* FLARE

GET IT AT YOUR JOBBERS

WOLVERINE TUBE CO.

1411 CENTRAL AVENUE DETROIT, MICHIGAN

BIG or SMALL

they're easy to fit with THE BAKER LINE

● Baker's complete line simplifies selling problems, for Baker distributors can fit every job *exactly* . . . with each installation "tailor-made." Baker offers the most complete line of refrigerating and air conditioning units on the market. 77 models for Freon or Methyl Chloride range from the sturdy two-cylinder ¼ H.P. unit to the powerful 60 H.P. size in single machine units and up to 125 H.P. in dual units, all equipped with genuine Timken tapered roller bearings and Nickelite connecting rod bearings.

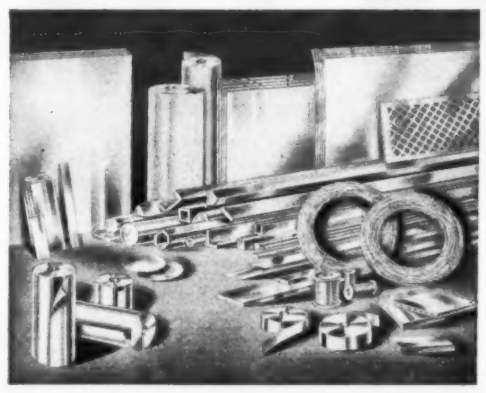
With a complete franchise, Baker distributors are prepared to handle any size installation, large or small. Baker's national advertising campaign coupled with sales promotion literature and engineering assistance from Baker's main offices and strategically located branch factories, mean increased sales and greater customer satisfaction.

A few territories for Baker dealers are still open. Inquiries are invited from responsible parties.

BAKER ICE MACHINE CO., INC.
1506 EVANS ST., OMAHA, NEBRASKA
Branch Factories: Fort Worth, Los Angeles, Seattle
Eastern Sales: New York Central Sales: Chicago
Sales and Service in All Principal Cities

Authority on Mechanical Cooling for over 30 Years

HUSSEY COPPER

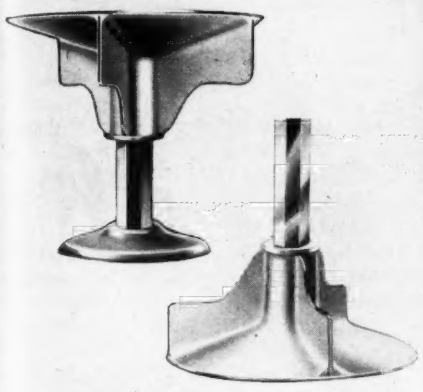


A 100% complete copper service—rolls and sheets in all finishes for every type of air conditioning apparatus—Sales offices and warehouses in every important industrial center to serve you promptly.

C. G. HUSSEY & CO.
A Division of Copper Range Company
MAIN OFFICE AND ROLLING MILLS, PITTSBURGH, PA.

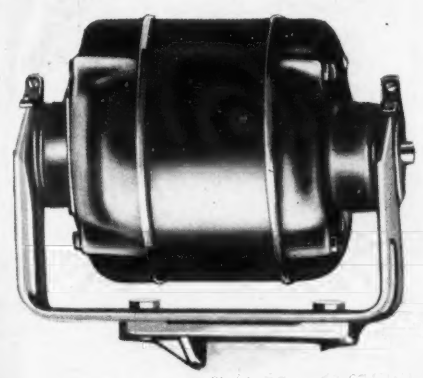
The Washer that has Everything!

PERFORMANCE ★ BEAUTY ★ PRICE ★



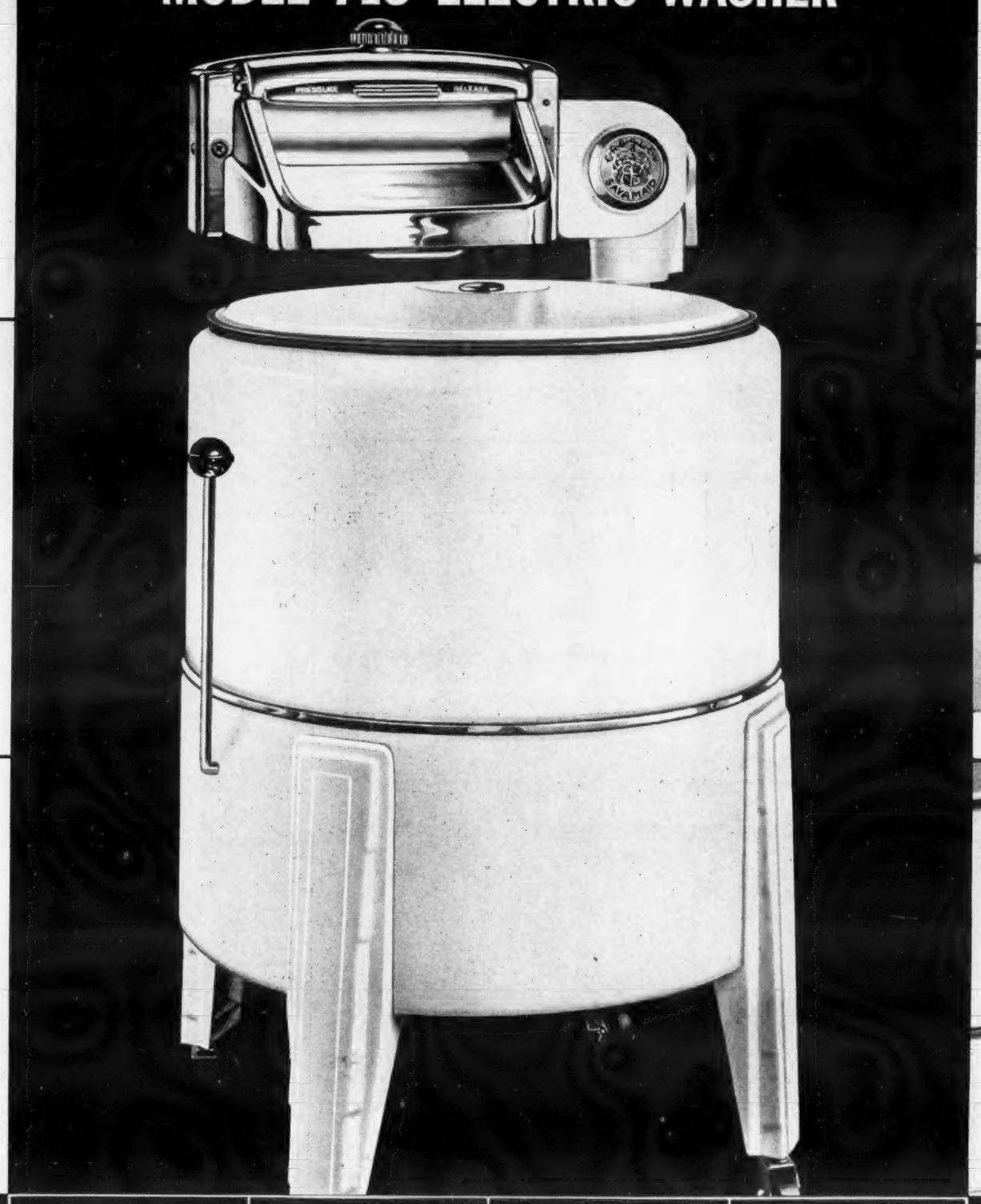
Exclusive Invertible Agitator Insures Thorough Washing of even the heaviest loads.

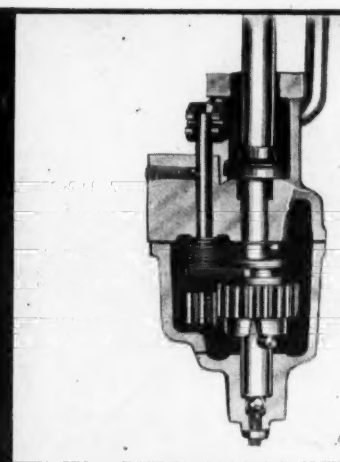
Patented, SEALED, ball-bearing transmission.



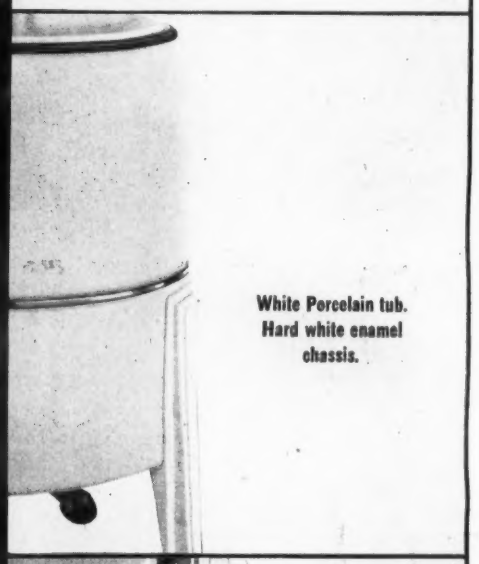
Splash-proof Heavy Duty Motor.

CROSLEY SAVAMAID ALL-WHITE MODEL 713 ELECTRIC WASHER

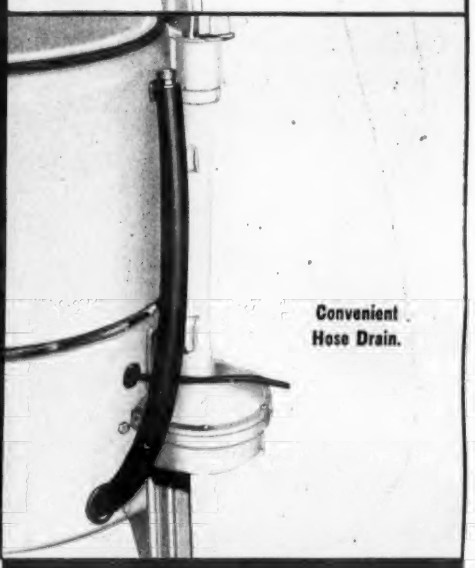




Patented Clutch Mechanism connects directly to agitator shaft.

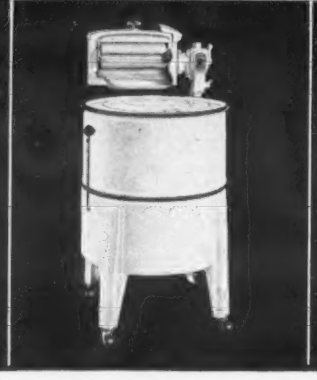


White Porcelain tub. Hard white enamel chassis.

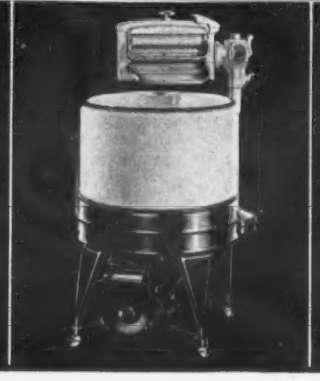


Convenient Hose Drain.

Model H-718 SAVAMAID Electric Ironer



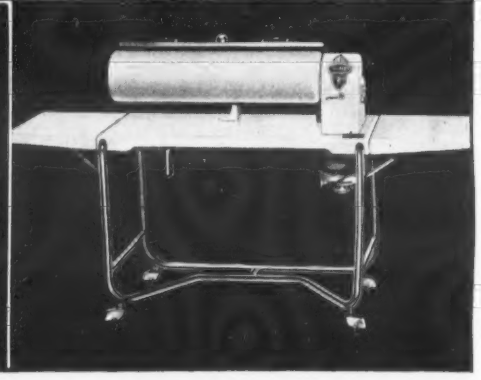
Model H-711 SAVAMAID Electric Washer



Model H-714 SAVAMAID Gas Engine Washer

Model H-715 SAVAMAID Gas Engine Washer

Model H-712 SAVAMAID Electric Washer



Model H-719 SAVAMAID Electric Ironer

Feature for feature, performance for performance, price for price, the new 1938 Crosley SAVAMAID All-White Washer-Ironer line outranks anything on the market. With the eye-catching beauty of its all-white porcelain and hard enamel finish; the long-life, trouble-free washing action of its patented, sealed, ball-bearing transmission, and its unusually low price, the Model H-713 SAVAMAID Electric Washer featured above is "tops" in the washer field . . . a distinguished leader that will bring you an unprecedented sales volume this year. And like it, every washer and ironer in the new SAVAMAID line stands "head and shoulders" over competition in its individual price range. See and sell this outstanding SAVAMAID Washer-Ironer line.

THE CROSLEY RADIO CORPORATION - - CINCINNATI

POWEL CROSLEY, Jr., *PRESIDENT*

Home of *"the Nation's Station"*—WLW—500,000 watts—70 on your dial

CROSLEY SAVAMAID WASHERS AND IRONERS

THE AIR AGE

BY F. O. JORDAN

More About Attic Ventilation

During any kind of a controversy, one of the easiest things in the world is to lose sight of the stand which originally started the ball a-rolling.

Air Age of June 2 took the position that attic ventilation can produce comfort part of the time, but not all of the time. It said that statements which claim that comfort without limitation can be secured by attic ventilation are just as misleading to the public as giving the general term "air conditioner" to a heating and humidifying unit without the limiting prefix "winter."

And we are convinced that any kind of misrepresentation injures the air-conditioning industry.

Since the following letters confine themselves to submitting evidence that attic ventilation can give relief during a portion of the time, as Air Age has stated and as every one knows, but do not refer to the fact that there are many times when comfort cannot result from its use, they are hardly to the point.

However, read them for yourself, for certainly they give their writers an unparalleled opportunity for free advertising.

What prompted the article in Air Age of June 2 entitled "Comfort and Attic Ventilation"?

It was the mass of articles and advertisements which had been called to our attention claiming that attic ventilation resulted in comfort **without limitation.** In some instances even unlimited daytime comfort was implied. Yet we all are aware that, since the attic fan falls far short of comfort on some nights and many days, the general claim of comfort without limitation is false.

If it is true that attic ventilation does result in comfort at all times in all "climes," what is the justification for the more expensive refrigerative summer cooling and dehumidifying system?

How about it, you advocates of honest-to-goodness air conditioning? What do you have to say for yourselves? Send Air Age your side of the story.

Ilg's Mr. Frank Has A Lot of Arguments

Ilg Electric Ventilating Co.
2850 N. Crawford Ave.
Chicago, Ill.
June 28, 1937

Dear Mr. Jordan:

I have your letter of the 24th and have also read your answer in the June 23 issue, which I do not find satisfactory at all.

Now, kindly understand that I again speak only for our company and you will have to learn as a magazine editor to differentiate between companies otherwise you are likely to get you and your magazine into trouble.

If you will refer to the Ilgattic bulletin, copy of which we sent to you, you will note that on the first page we make the statement that when evening comes outdoor temperature drops 15 to 25°. Both of your articles would seem to make it appear that this is a fake claim. You make the statement that during a hot spell the outdoor temperature is 85 or 90°.

I am enclosing herewith the official weather report printed in the Chicago Daily Tribune, Friday, June 25. Note that the maximum in Chicago was 97 and minimum 70, a drop of 27°. Now examine all the other places that had the highest temperatures and you will note that in nearly every case there is a drop of at least 20° and in some cases 30° or more.

You will also note that this applies to cities all over the United States such as Pittsburgh, Washington, Dallas, Evansville, Kansas City, Salt Lake City, San Antonio, Albany, Atlanta, etc. If you will examine these weather reports for a few days you will find that there is nothing fluky about this one; in fact, it is just about average. I can assure you on that point because I have been reading them daily for years.

Now, another point which you have completely overlooked. That is the fact that all cooling is relative. The real job that the attic fan does is to remove the high temperatured air in the attic and replace it with outside air whatever the temperature.

The point is that no matter how hot it may be outside, the attic after a very hot day is many degrees higher. If you think 130° is an exaggeration just take a thermometer up in your attic about 6 o'clock in the afternoon after a 95 to 100° day outside.

It is obvious that if you pull down your attic temperature from, let's say, 120 to 90°, that you have already accomplished a job of comparative "cooling" even though the outside temperature remains 90 all night, because if you had not pulled out the high temperatured attic air, the upstairs of your house would probably be 110 all night instead of 90 and we will say that is cooling in any language and in any part of the country.

Now, another point that you have overlooked is that you can get cooling without any relation whatever to temperature. Surely you as an air-conditioning editor must know that. We of course refer to cooling by evaporation. With an attic system liberally designed so that you can get real air motion, you get a large amount of cooling entirely by air motion that has nothing whatever to do with temperature.

* * *

Now, Mr. Jordan I am not interested in further controversy—I would prefer not to have this letter published—if you do publish it, I wish you would publish it in full and let it be known that the Ilg company stands squarely on each and every claim on attic systems made in its catalog and we believe we have proved all of our points by submitting evidence to you and we do not see where you have proved any of your points. J. M. FRANK

Answer: As a registered consulting engineer in the State of Michigan, I have used Ilg equipment and know its possibilities—F. O. Jordan.

Just What Does a Weather Report Prove?

Ilg Electric Ventilating Co.
2850 N. Crawford Ave.
Chicago, Ill.
July 6, 1937

Dear Mr. Jordan:

Following further the subject of night cooling, I believe you will be interested in the enclosed chart published by Dallas Power & Light and showing United States weather bureau maximum and minimum temperatures for Dallas the summer of 1936. Believe this will bear out the claim made in our letter and our literature that as an average proposition, temperature drops from 15 to 25° at night after a hot day.

If you pick out the hottest days in Dallas last year, those at or near 100, you will find that in almost every case the temperature dropped at least 20°. For instance, on June 10, it dropped from 100 to 74—on June 22 from 105 to 83—on July 19 from 105 to 78; there is a drop of 27°—on August 10 which broke Dallas record, a drop from 110 maximum to 83 minimum which is 27.

Now, if you don't think you get a real cooling "effect" after a 110° day with a drop to 83° then all we can tell you is that you just don't understand the attic cooling idea. Is there any more evidence that we can present to you, or are you convinced?

J. M. FRANK

Answer:

Thanks for your proof that Air Age is right in saying that attic ventilation results in comfort part of the time. How about the hot days? Can it give comfort then? If so, there is no justification for real summer air conditioning as we understand it. If not, attic fan ads should read "Comfort at night—usually."

Ah! A Newcomer Enters the Controversy

Viking Air Conditioning Corp.
Main and Center St., N. W.
Cleveland, Ohio
July 6, 1937

Editor:

It is to be hoped that "The Air Age" represents only one man's opinion. Your June 22 column devoted itself exclusively to "Anti-Attic Ventilation"—and for what reason? Mr. Frank's letter, in support of attic ventilation, received anything but a sympathetic treatment at your hands. While Mr. McLaughlin's letter, classing attic ventilation as a "parasite of air conditioning" was amplified to the extent of a column or more.

By the powerful instruments of inference you threw attic ventilation into the same category as those "so-called air conditioners" which warranted the attention of the Federal Trade Commission.

In this same issue of REFRIGERATION NEWS you featured on your front page an article which pointed to 43 air conditioning installations, made in Houston during May. Scanning that list, 17 are found to be residential installations. During that same period, in Houston, nearly 10 times that number of fans were installed in attics for night air cooling. I wonder how many of those people are kidding themselves?

There are very few, if any, attic ventilating fan manufacturers who claim to control temperature or humidity; but they do say, and can substantiate it with proof in all parts of the country, that attic ventilation will provide **comfort.** In fact, we will go further, and say "satisfying comfort"—since comfort is a relative expression. Talking in terms of temperature reduction in the case of attic ventilation is telling only half the story, since the breeze which is produced by one to two minute air change is quite appreciable.

Since we have started talking about Houston, let us continue to, as it represents a typical Southern city.

In looking over the weather bureau report for July 1936, you will find 18 days when the day-time temperatures were between 90 and 95°, yet during that entire period there was only one night when the temperature was as high as 77°, most of them being 74 and 75°.

If you think that those 15 to 20° drawn through the house during the night do not show up as an appreciable temperature reduction the next day, you have another think coming.

Of course, just as the 95° temperature lasts only a few hours so does the 74 and 75° temperature and we do not intend to infer that these low temperatures should be taken as a night-time average.

But even at 8 or 9 o'clock it will be found that the temperature outside is already within the comfortable zone and when you add to this the breeze that accompanies the rapid air change now recommended, you would simply have to twist facts to prove that the occupants of an attic ventilated home are not thoroughly comfortable.

Attic ventilation is no more a cure-all for summer comfort than is mechanical air conditioning. It does not filter the air—it does not dehumidify—it does not reduce the temperature 10° below the outside temperature (if that's what you want); but it does produce very close to ideal comfort conditions in practice and it does this at a cost of approximately $200 for an entire house—not one room only.

"Attic Ventilation" is just as fully entitled to share the summer comfort field with "Air Conditioning" as the automobile is entitled to share the transportation field with the railroads. MARION I. LEVY

Answer:

Six and one-half inches for Mr. Frank's letter and 3 inches for Mr. McLaughlin's letter—measure them.

If the 10 times as many Houstonians who bought attic fans as bought air conditioners made their decision because they expect to get relief part of the time at lower initial cost, they probably are not "kidding themselves."

But they have been kidded if they purchased attic ventilation because they have been told, even by inference, that it will give them comfort without limitation as to time and outside condition.

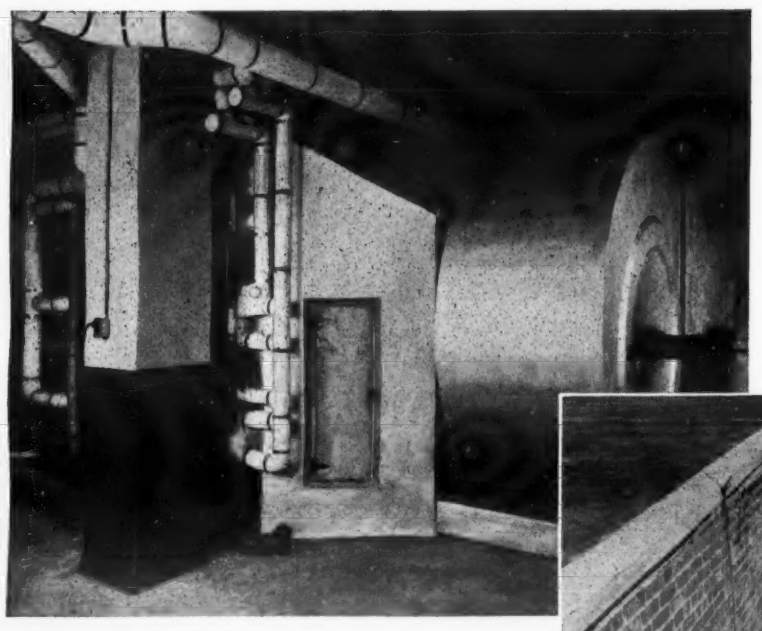
Certainly "attic ventilation" is entitled to share a place with "air conditioning," for attic ventilation gives a measure of relief. We have admitted that.

But it is entitled to its place only if kept in its "place," and not advertised and sold upon the misrepresentation that it will result in perfectly "satisfying comfort" at all times.

Come on in everybody. This is not a private fight.

CORKBOARD

CUTS COOLING COSTS FOR McCRORY



Air conditioning equipment and ducts in new Dayton store are insulated with Armstrong's Corkboard

ABOVE—THOROUGH INSULATION *makes for economical operation of this air conditioning equipment in the McCrory Stores, Dayton, Ohio. Mixing chamber, fan housing, and ducts are guarded by 2" Armstrong's Corkboard.*

RIGHT—OUTSIDE DUCT *in the McCrory air conditioning installation is protected by 2" corkboard insulation, covered with waterproof cement and a finishing coat of Armstrong's Weatherproof Plastic.*

AIR conditioning pays extra dividends in economical operation and lasting efficiency when refrigerating ducts and equipment are properly protected by corkboard insulation, as in the McCrory Stores installation shown above.

Countless stores, restaurants, and public buildings of all kinds today enjoy summer cooling and year-round air conditioning at lower cost . . . thanks to cork. The natural cell structure of the cork particles used in making Armstrong's Corkboard and Cork Covering forms a positive barrier to the passage of heat. That means efficient operation, with little loss of costly refrigeration. And these same cork cells have high natural resistance to moisture—which means longer efficient life.

Armstrong's Corkboard is made of light, strong boards, 12" x 36", 18" x 36", 24" x 36", and 36" x 36", in various thicknesses from 1 inch up. It is easily erected in any kind of construction. Because of its light weight, corkboard is ideally suited for the insulation of ducts . . . and it shapes easily to fit curves.

Armstrong engineers will gladly work with you in figuring insulation requirements for any kind of job. Write today for complete details and samples of Armstrong's Corkboard and Armstrong's Cork Covering for cold lines. Address Armstrong Cork Products Company, Building Materials Division, 994 Concord St., Lancaster, Pennsylvania.

Armstrong's CORKBOARD INSULATION

G-E Launches Cooling Training Program

BLOOMFIELD, N. J.—An extensive educational program designed to meet the need for trained manpower in the engineering and selling of modern air conditioning has been launched by General Electric Co. The plan is modeled along the lines of the famous "test" courses inaugurated by the company in 1888, from which approximately 15,000 men have since graduated to responsible positions in the electrical industry.

"The history of the rise of great industries is a history of opportunity for men of ability," declares J. J. Donovan, manager of the G-E air-conditioning department. "Now it remains for a new industry to bring new opportunity to men with ambition. We believe that new industry is air conditioning.

"But as in any new art, trained men with a specialized knowledge are required, and there is a great shortage of men who know air conditioning. Executives in the business realize that the only way this shortage of manpower can be filled is to develop and train new men. This training is not just a matter of attending a school or taking a course—it is a matter of practical experience over a period of years."

While sponsored by the company itself, the new program will be worked out through distributors in the field, as it is felt that the distributor organization offers wider practical experience and greater employment opportunities for students who are learning the business.

The company's air-conditioning division for several years has sponsored various sales-training and engineering courses, factory schools, and related types of educational activity. The new program will augment these greatly.

The air-conditioning training program will be open primarily to graduates of colleges, technical schools, and high schools who are desirous of establishing themselves solidly in the industry. In special cases, men without technical training may be taken, provided they show *potential* capabilities in the business.

Practical manuals, courses, and distributor training activities, designed by the air-conditioning department, will be supplemented by various forms of instruction in the field by district managers and factory men. Applications for training are to be made to distributors or to the headquarters of the air-conditioning division in Bloomfield.

Nashville Cafe Cooling Job Attracts New Customers

NASHVILLE, Tenn. — Manhattan Cafe's recently installed Servel air-conditioning equipment is attracting many new customers, according to manager George C. Changes.

A. N. Friedman, head of the Friedman Electric Co., Servel distributor in this territory, sold the installation.

Floor Type COMFORT COOLER

LOW PRICED

For Homes, Offices, Stores
Compact, Attractive Cabinet
Very Quiet

Made in 1/2, 3/4, 1 ton sizes

Direct Expansion
Cold Water Circulation

Prompt Shipment
Write today for specifications and prices

•

Information on other floor type units sent on request

•

SAM KENNARD, *Inc.*
3333 MARKET ST.
ST. LOUIS, MO.

Utility Campaign Stresses Summer Conditioning

KANSAS CITY—Advantages of summer air conditioning in stores, hotels, clubs, offices, restaurants, hospitals, and homes are emphasized in the current series of local newspaper advertisements of Kansas City Power & Light Co.

Neither selling nor installing air-conditioning equipment itself, the utility offers its services to individuals considering installations.

York Receives Navy Contract To Equip 13 Vessels

YORK, Pa.—York Ice Machinery Corp. has received a contract from the United States navy department to furnish air-conditioning and refrigerating equipment for 13 destroyers, three cruisers, and three submarines.

The equipment will be installed in the navy yards at Brooklyn, Philadelphia, Boston, Norfolk, Charleston, Portsmouth, Puget Sound, and Mare Island.

New Crosley Coolrest Features Transparent Canopy

CINCINNATI—New design and features, chief of which is a transparent canopy, mark the 1937 Crosley Coolrest, the air-conditioning unit for beds introduced four years ago by Crosley Radio Corp.

The new transparent canopy is made of a new material known as Pliofilm. The material provides the necessary insulation to confine the cooled air to the sleeping compartment, and is soft, washable, lightweight, and resists oil, moisture, grease and alcohol.

The Coolrest is said to reduce the temperature inside the sleeping compartment approximately 10° F. and dehumidify the air. The unit requires no plumbing connections, can be easily transported from one room to another, and quickly mounted or dismantled. It is put into operation by being plugged into a light socket.

The unit may be operated with windows open, to assure constant fresh air supply.

Freon gas is the refrigerant used. List price of the unit, complete with canopy, is $150 f.o.b. Cincinnati.

Kelvinator Using Postcard Series To Promote Room Coolers

DETROIT—As part of its room cooler advertising campaign, said to be the most vigorous in the company's history, Kelvinator division of Nash-Kelvinator Corp. is supplying its room cooler dealers with a series of six direct mail cartoon postcards.

The cards are mailed to selected lists of prospects every second or third day until the complete series has gone to each prospect.

First five cards depict a perspiring business man being advised by the towel-supply man, the messenger boy, the charwoman, the window cleaner, and the mailman that efficient, comfortable work depends upon temperature control.

Sixth and last card in the series shows the business man rushing out of his office, shouting, "No, I'm not going swimming! I'm going out and buy me a ROOM COOLER!"

Kelvinator sales officials report that room cooler sales so far this year number more than three times those made during all of 1936.

Completion of Statler System Celebrated at Banquet

ST. LOUIS—Installation of added equipment making St. Louis' Hotel Statler the world's largest air-conditioned hotel was formally celebrated at a luncheon June 29 given by Frank A. McKowne, president of Hotels Statler Co., Inc., and Ward B. James, manager of the Statler, to about 200 business, industrial, and civic leaders.

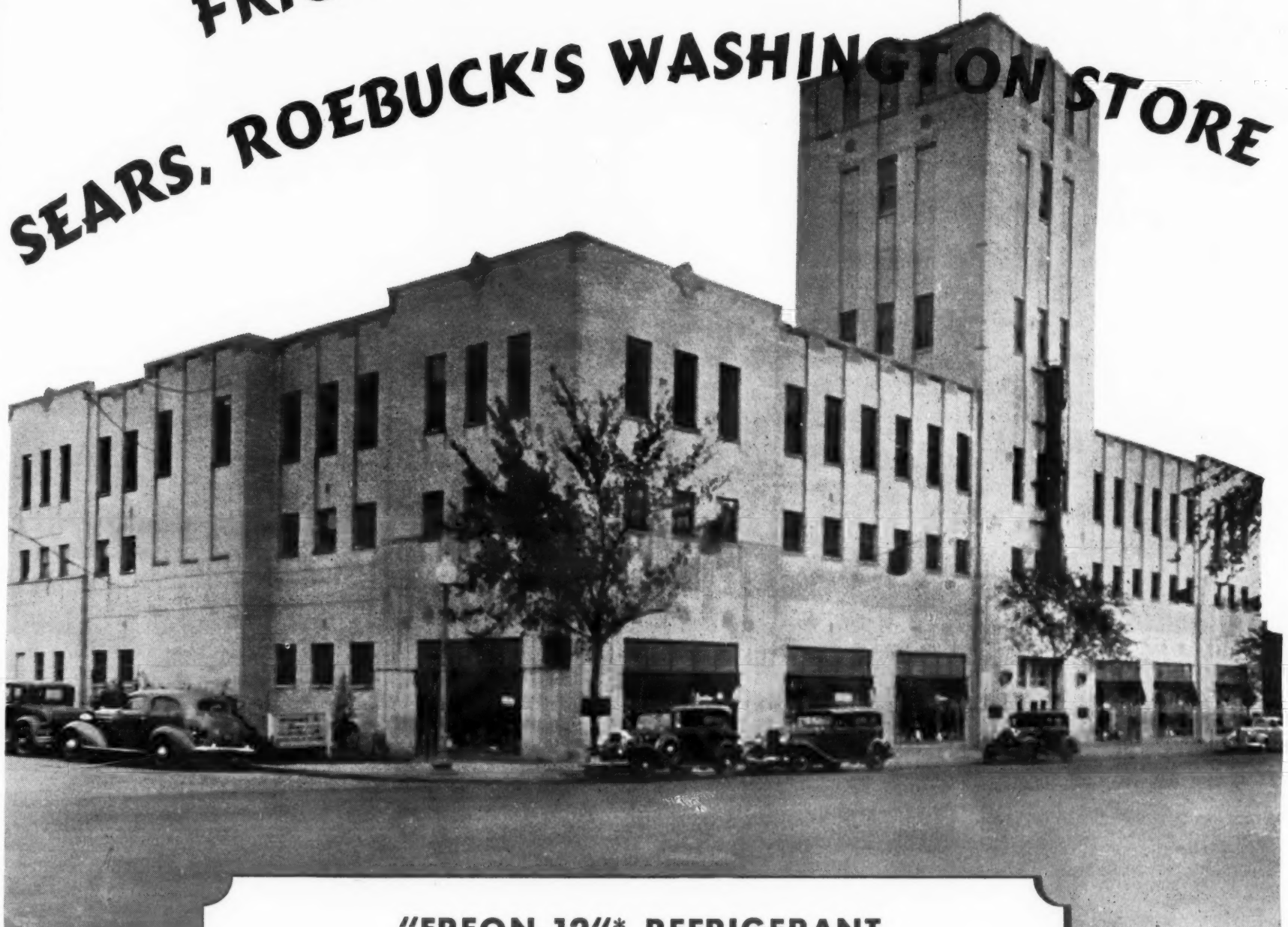
Guests included Mayor Dickmann of St. Louis and A. C. Downey, president of Airtemp Corp.

Every room in the hotel is now air cooled for the summer comfort of Statler guests. First installation, 300 guest rooms, was made about this time last year.

Room Cooler Contest Offers Prize for Employe Leads

BIRMINGHAM, Ala. — Alabama Power Co. has a room cooler campaign under way with a $10 cash prize for employes turning in names of prospects who are sold. The campaign continues through August.

FRICK INSTALLATION COOLS SEARS, ROEBUCK'S WASHINGTON STORE



"FREON-12"* REFRIGERANT
USED IN NEW 120-TON JOB

SIX 20-ton Frick compressors cool the basement and three floors of the department store of Sears, Roebuck & Company in Washington, D. C. "Freon-12" is the refrigerant used.

Most outstanding air conditioning installations in the United States and abroad use "Freon" refrigerants. Such large installations as those in the Department of Justice Building, the Post Office Building, the Senate Office and the Archives Buildings, the Administration Building of the Department of Agriculture, all use "Freon" refrigerants. And now the new installation for the United States Capitol is added to the list using "Freon" refrigerants.

"Freon" refrigerants are non-toxic, non-flammable, non-explosive. They are odorless when mixed with air up to 20% by volume. They do not harm foods, fabrics or furs.

"Freon" refrigerants meet all the specifications for safety set by the Underwriters' Laboratories of Chicago. They have been tested by the U. S. Bureau of Mines. 99½% of all mechanically cooled railroad trains use "Freon" refrigerants. They are used in ships, in mines deep underground, in hotels, restaurants, department stores, homes, schools, hospitals, offices, factories—in every type of installation, large or small.

Be sure to specify "Freon" refrigerants for your cooling system.

KINETIC

*"Freon" is Kinetic's registered trade mark for its fluorine refrigerants

FREON
REG. U. S. PAT. OFF.
safe refrigerants

KINETIC CHEMICALS, INC., TENTH AND MARKET STREETS, WILMINGTON, DELAWARE

Jobber Finds Storage Locker Business A Field of Profitable Endeavor

SIOUX CITY, Iowa—National Refrigeration Service Co., refrigeration parts and supply jobber here, has found a new field of profitable endeavor in the engineering of refrigerated locker storage installations.

The company offers engineering service to any dealer or distributing organization on any kind of commercial equipment, and has made more than a dozen locker storage installations which are distinguished by the use of Dole "cold plates."

According to J. O. Harvey, manager of the National Refrigeration Service Co., the small grocers and meat merchants in rural communities constitute the best prospects for such locker systems because they have an established business and are in a better position to install such equipment. The profit possibilities are greater for them than they would be for an individual who might try to operate only the locker storages.

Another factor that makes a refrigerated locker storage proposition highly acceptable to the merchant is that it brings new customers into his store. According to Mr. Harvey, the locker renter visits his locker on an average of twice a week, and this of course greatly boosts the store traffic.

Some merchants in the smaller-sized towns declare that the locker system has been their salvation in that it has kept the local trade "at home."

Figs. 1 and 2 shows two typical layouts designed by National Refrigeration Service Co. for refrigerated locker installations. The layout in Fig. 1 will handle from 180 to 275 lockers. The layout illustrated in Fig. 2 will handle from 275 to 425 lockers.

According to Mr. Harvey, the dealer's net cost on refrigeration equipment only (if the installation is made on the inside of another building) would be from $1,000 to $1,400 for the layout shown in Fig. 1; and from $1,650 to $1,900 for the layout shown in Fig. 2. (These costs are less plumbing, wiring, and labor.)

For a quick estimate of the cost of a complete layout, the figure of $6 per locker will provide a reasonably close estimate, Mr. Harvey says.

The cost on lockers alone can be figured at $3.90 to $4.60 customer's net each (locker size 16 x 18 x 30 inches with padlock). In figuring the cost of insulating and building the chill room, locker room, and quick freeze room, the customer's cost will be approximately the same price as the refrigeration equipment proper, Mr. Harvey declared, if something other than cork is used.

Mr. Harvey advises the refrigeration contractor to add his profit to the total of the items of refrigeration equipment, wiring, plumbing and labor; the lockers and insulation, since they are generally sold by a locker salesman, will be figured separately.

Fig. 1—Layout of Cold Storage Plant with 180 to 275 Lockers

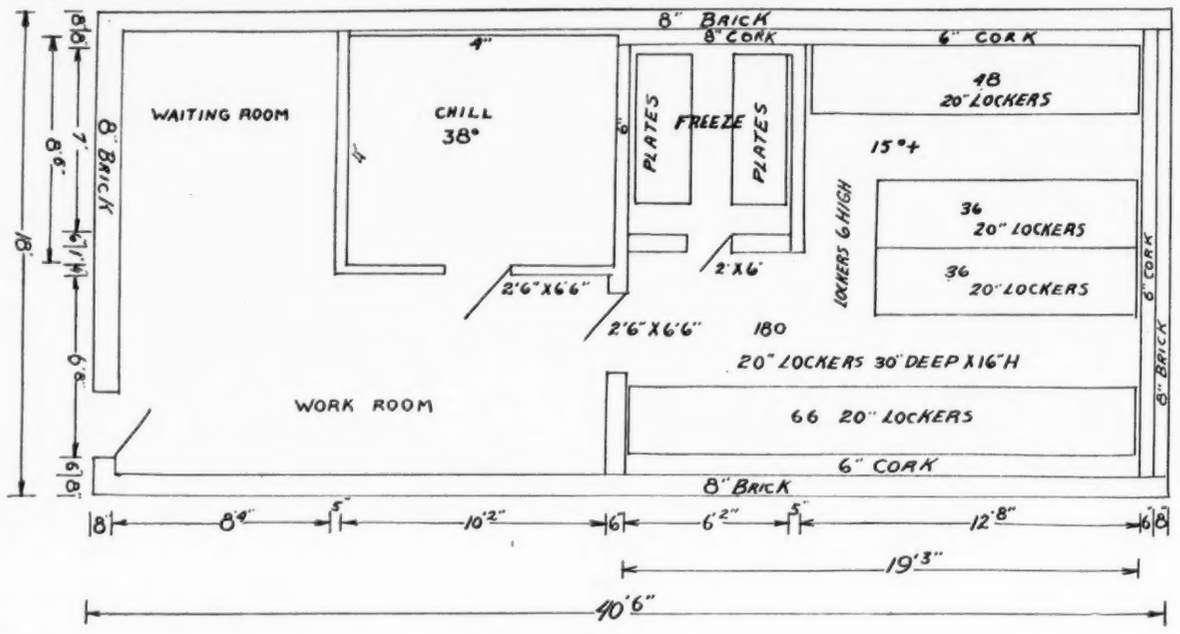
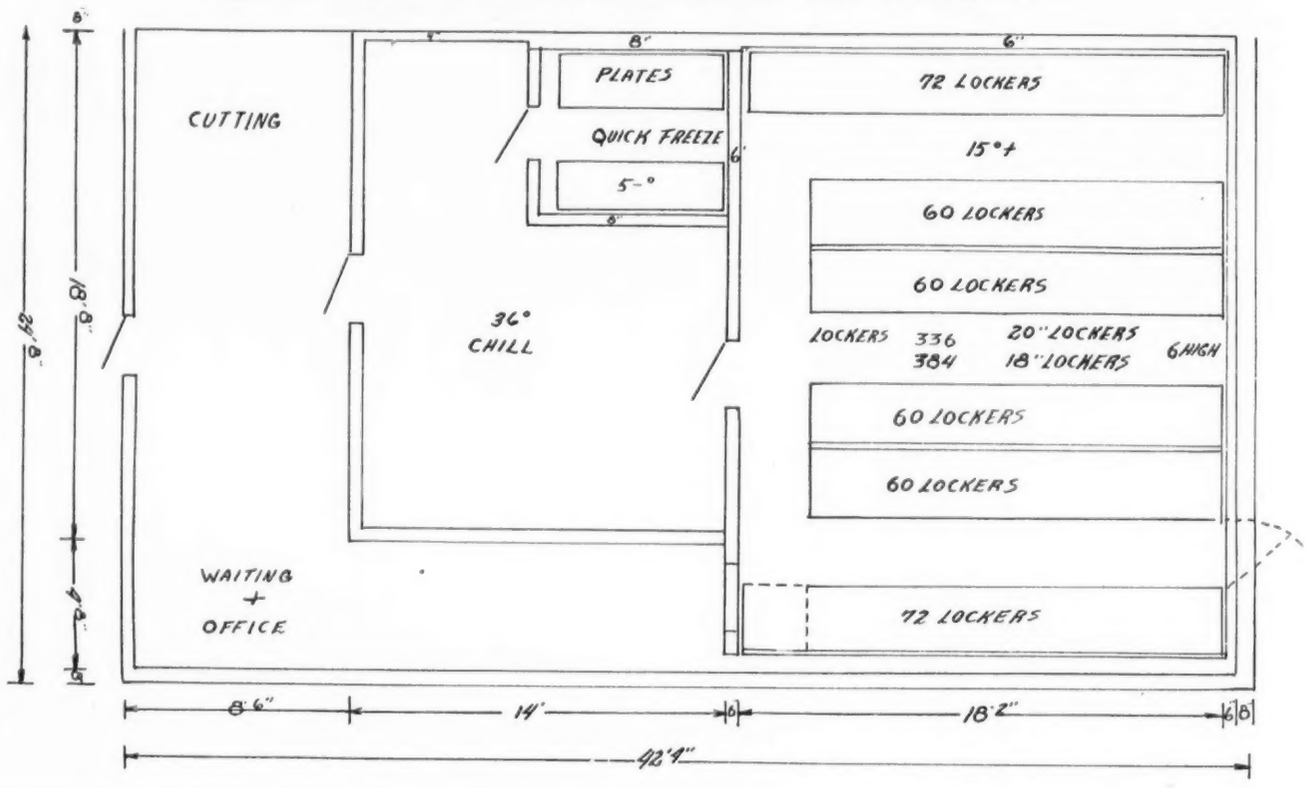


Fig. 2—Layout of 275 to 425-Locker Cold Storage Plant



Conditioning to Feature Peoria Heating Show

PEORIA, Ill. — Air-conditioning equipment will be featured at the Peoria National Heating Show to be held here Aug. 5 to 8.

Joins Alabama Appliance Co.

BIRMINGHAM, Ala.—Charles W. Millican, Jr., of Selma, Ala., has come here as commercial manager for Alabama Appliance Co., Frigidaire distributor.

New 18-Cu. Ft. Unit Added to McCray's Commercial Line

KENDALLVILLE, Ind. — Designed for use in the small restaurant, cafe, grill, or in the home which requires extra refrigeration facilities, a new wall-type refrigerator with 18.7-cu. ft. capacity has been added to McCray Refrigerator Co.'s line of commercial equipment.

Known as model RF-418, the refrigerator is 46¼ inches wide, 28 inches deep, and 78 inches high. Exterior finish on the front and sides is of white Duralite, with black trim. The interior is also of Duralite finish.

Insulation in the new model is of 3-inch corkboard. Food compartments are equipped with six metal bar shelves. Doors are fitted with double pneumatic gaskets. Automatic electric lights illuminate the cabinet interior when door is opened. Hardware is of modernistic satin-finish chrome-plated bronze.

The refrigerator is equipped with McCray coils and unit. A No. 14 or 144 McCray compressor is required to cool the cabinet.

Built for electric refrigeration only, model RF-418 can be equipped with a vegetable crisper and ice maker attachment if desired.

Beatrice Creamery Truck Uses Kold-Hold Units

DAVENPORT, Iowa—A temperature of —2° F. is maintained by Kold-Hold units hooked up with a 1-hp. York Freon compressor in the new cab-over-engine truck unit built by H. McFarlane & Co., Inc., Chicago, for Beatrice Creamery Co. here.

Streamlined body of the truck is equipped with 6 inches of Dry-Zero insulation in roof, sides, and ends, and with 6 inches of cork in the floor. Both Dry-Zero Sealpad and blanket are used.

Mounted on an International Harvester 3-300, 99-inch wheelbase chassis, the truck body is equipped with three doors on the curb side, and two in the rear. One of the doors provides access to the compressor compartment.

Capacity of the truck is 325 gallons of ice cream and 400 lbs. of butter.

Lipman Equipment Installed In Sioux City Hotel

SIOUX CITY, Iowa—Modern Fixtures and Appliances has installed Lipman refrigeration equipment in the New Empire room of the West hotel here.

Gilmer "V's" DO A BETTER JOB

A Gilmer V-Belt is never skimped!

Full Size
Full Width
Full Thickness

A Gilmer Belt runs *right* in the groove... a Gilmer does not turn over

BRUTE-STRONG • FULL-BODIED • MINIMUM STRETCH GILMER BELTS RUN QUIETLY UNDER PULSATING COMPRESSOR LOADS

GET Gilmer

Get the belt that *fits* the job... Get Gilmer, the only V-Belt with THOSE 5 FAMOUS FEATURES

Solve YOUR V-BELT PROBLEMS with the Gilmer Catalog. Get your *Free Copy* today.

L. H. GILMER CO.
Tacony, Philadelphia
The Oldest Firm of Rubber Fabric Belt Specialists

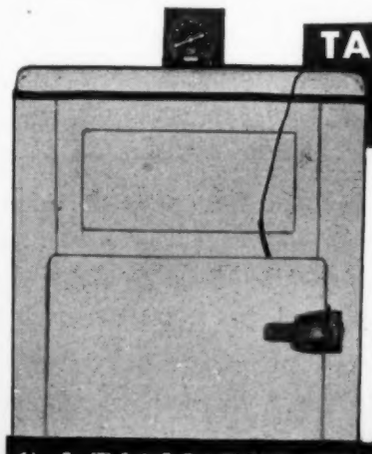
Quality KNOWS NO COMPETITION!

The HILL all-porcelain Reach-in Refrigerator for commercial use is made in only one quality—the BEST. All-porcelain, inside and out, gracefully proportioned, free from exposed nuts or bolts, equipped with improved hardware, built with an accessible coil door, and insulated with the best sheet corkboard, waterproofed.

Send for 28-page illustrated catalog and discounts, using your business letterhead.

C. V. HILL & CO., Inc.
HILL PRODUCTS DIVISION
Trenton, New Jersey

192



TAG DIAL THERMOMETERS GIVE COMPARTMENT TEMPERATURE AT A GLANCE . . . . . .

Convince that "hard to sell" customer the "easy TAG Dial Way"—Just place the bulb in the food compartment or on the evaporator coils—set the dial on top of the box as illustrated—close door—then watch the pointer—it will move almost as fast as the second hand of your watch. Within a minute the true temperature will be indicated accurately for all to see. You need this instrument in your service and sales work. Get the information today. Write for Catalog No. 1136-25.

ASK YOUR JOBBER ABOUT TAG CONTROLS AND TEST EQUIPMENT

C. J. TAGLIABUE MFG. CO. 550 PARK-AVE-BKLYN-N-Y-

3 Peerless Coolers Used in Pittsburgh Florist Shop Job

PITTSBURGH — Three full-view walk-in cooler boxes refrigerated by Peerless "Flash" coolers have been constructed in the shop of McCallum Co., local florist.

The boxes, equipped with full glass doors and windows which afford an unobstructed view of the contents, were specially designed by Engineer Johnston, of McCallum Co. The cooling units, manufactured by Peerless of America, were sold and installed by Wood Refrigeration Co. through Williams & Co., Peerless distributor in this territory.

Constructed with only a single tier of coils, these coolers have little depth and so protrude only a few inches down into the box. The multi-louvered drip pans beneath the coils are constructed of highly polished aluminum, and designed so that air may circulate freely.

The coolers used in this installation are of the double drip pan type with drain collector trough at the middle of the unit. The Peerless rifled coils are constructed of 3-inch square solid aluminum fins automatically wedgelocked into tinned copper tubing and bent on 4-inch centers so that there is a 1-inch open space between each coil course to allow free circulation of air.

It is said that the Flash cooler delivers a large volume of cooled, tempered air and that the resultant decrease in condensation and increase in humidity tends to keep the flowers in better condition, and practically to eliminate loss from spoilage.

Larkin Assigns Interest In Cooler Patent to Commercial Coil Co.

CHICAGO — Patent litigation between Commercial Coil & Refrigeration Co. and Larkin Refrigerating Corp. over the "Coltrol" brine-circulating type beer cooler has been settled by means of a consent decree entered in the state and federal courts, under the terms of which Larkin will no longer manufacture a beer cooler of the "Coltrol" type.

Under the terms of the decree, an agreement reached in a previous suit whereby Commercial Coil Co. granted Larkin a limited license to manufacture and sell a water cooler having a capacity of not less than 75 gallons and a 15° F. temperature drop, and having a circulating pump of not less than ⅛ hp., was ratified and will be effective.

The "Coltrol" beer cooler was designed by Matthew P. Fugle, Chicago refrigeration engineer, who assigned his first patent on the cooler to Commercial Coil Co., but while still working for Commercial Coil, assigned a half-interest in his second patent on the device to Larkin Refrigeration Corp.

Commercial Coil brought suit to compel an assignment of the second patent and later brought suit for infringement of the first patent. By the terms of the consent decree Larkin and Fugle assign their interests in the second patent to Commercial Coil & Refrigeration Co.

New Glass Insulation Being Marketed by Armstrong Cork

LANCASTER, Pa. — Armstrong-Corning wool, a new fibrous glass insulation material for use in refrigerated truck bodies, railway cars, and airplanes, is now being produced by the Corning Glass Works, Corning, N. Y., and sold by Armstrong Cork Co. here.

This insulation can be obtained in blanket form in thicknesses from ¾-inch to 5 inches, in widths of 9 feet, and in lengths of 50 feet or more. It may be faced on one or both sides with Sisalkraft, muslin, or any specified material. In addition to the blankets, it is obtainable in plain bats, rolls, and other forms.

Some of the advantages claimed for Armstrong-Corning wool are: high insulating efficiency; light weight; resiliency that causes it to expand instead of settling under vibration; freedom from absorption of moisture or fumes; and felting properties that permit its being quilted without facings. It also is said to be fireproof and acid-resistant.

Kingston and McDonald Open New Branch

MASSENA, N. Y.—Kingston & McDonald, distributor of General Refrigeration Co.'s Lipman refrigerating equipment in Potsdam and Ogdensburg, N. Y., has opened a new branch office here.

Fogel Pittsburgh Distributor Moves to New Quarters

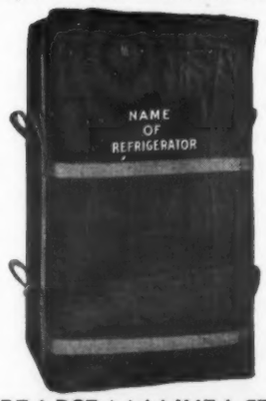
PITTSBURGH — The Pittsburgh Case Sales Co., Fogel Refrigerator Co. distributor, has moved to new headquarters and display rooms at 1327 Penn Ave. here. Walter R. Brown and H. George Entress have charge of the territory.

Servel Distributor Named In Sacramento Area

SACRAMENTO, Calif. — Independent Refrigeration Service Co. has been appointed distributor of Servel electric refrigeration and air-conditioning products in this territory.

THE MASTERCRAFT
ADJUSTABLE PAD AND CARRYING HARNESS
FOR SAFE DELIVERY OF AUTOMATIC REFRIGERATORS

Pad and harness ADJUSTABLE to many sizes and styles of cabinets. Economical—Efficient. Sturdily constructed, easily applied. Name of refrigerator attractively lettered on pad without charge.



Pad (Adjustable) $9.50 ea.

Harness (Adjustable) $6.00 ea.

The Pad and Harness are separate.

Individual carrying straps $1.75 each and up. Write for 1937 Folder & Prices on entire Pad Line.

BEARSE MANUFACTURING CO.
3815-3825 Cortland Street, Chicago, Illinois

Remember
DOOR GASKETS WEAR OUT, TOO

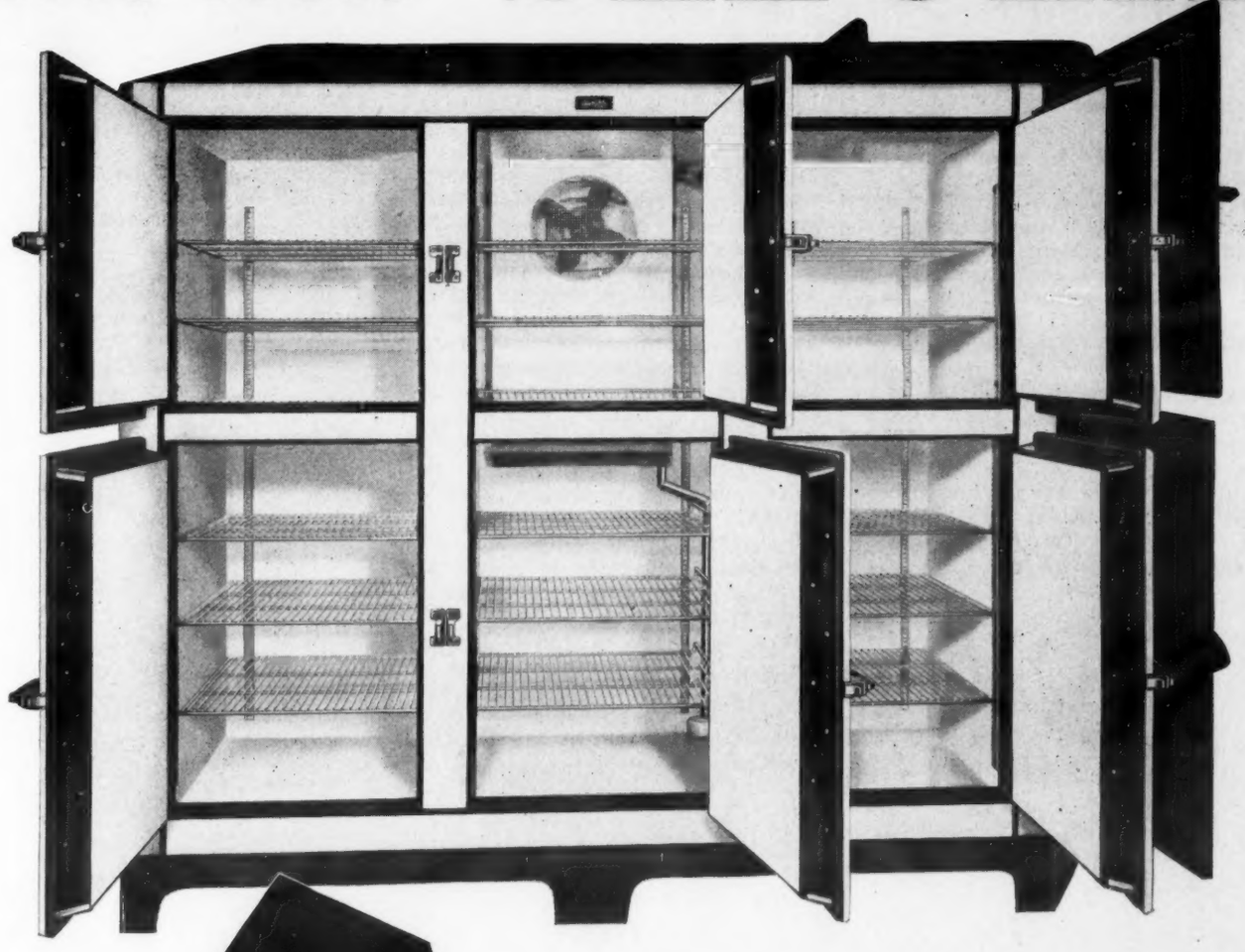
Few refrigerator parts are subjected to such hard and continuous wear as door gaskets. Nor are there many parts more vital to safe and economical operation. Thousands of doors are in need of gasket replacements. Here is an opportunity to offer a service that is both in demand and highly profitable.

Miller makes it easy for you to get this business. Their simplified line of 20 gasket types enables you to meet 80% of all replacement needs. Years of specialized experience in this field assure you a product of proper design and highest quality.

Be prepared. Send for illustrated price list. If not obtainable through your local jobber, write direct.

THE MILLER RUBBER COMPANY, INC. Akron, Ohio

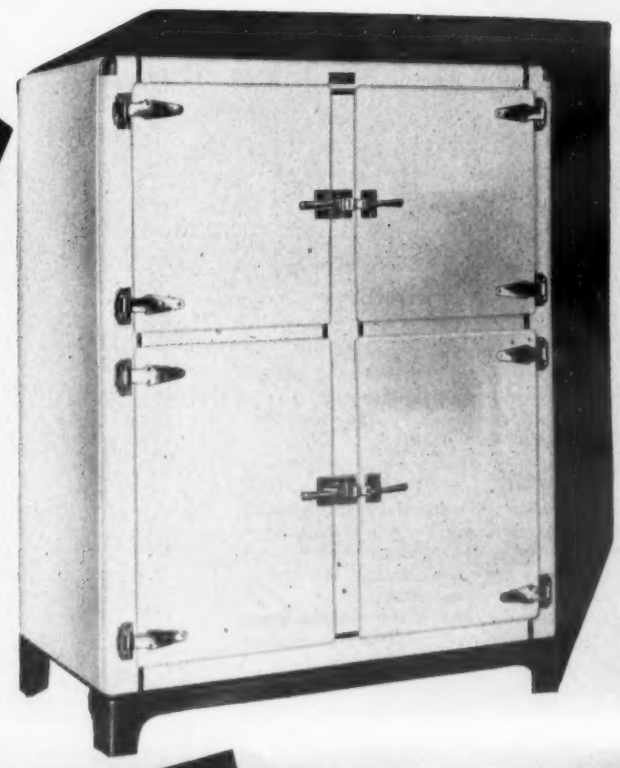
the new SEEGER



A·C 64
Net capacity 64.1 cu. ft.
Shelf area inc. bottom
89.1 sq. ft.

air · conditioned cabinets

A·C 40
Net Capacity 41.9 cu. ft.
Shelf area inc. bottom
61.97 sq. ft.



A·C 32
Net capacity 32.55 cu. ft.
Shelf area inc. bottom
45.06 sq. ft.

self-contained

These new, modern Seeger Air Conditioned Cabinets are factory equipped with the air conditioning unit which automatically cools, washes and humidifies the air. An outstanding and timely development in commercial refrigeration—write for detailed specification folder.

Seeger
REFRIGERATOR COMPANY
St. Paul — New York — Boston — Chicago — San Francisco

SELLING ELECTRIC RANGES

Best Range Salesmen Have One at Home And Know How to Cook on It, National Survey by Westinghouse Shows

MANSFIELD—A knowledge of practical cookery and ownership of an electric range are two of the most important factors behind successful range salesmanship, reports Reese Mills, range sales manager of Westinghouse Electric & Mfg. Co., after a survey of 113 of the best retail salesmen in the country.

The survey showed, Mr. Mills says, that 25% of the salesmen sell 75% of the ranges. Seeking their success secret, investigation revealed that:

Sixty per cent of the men owned an electric range, and used it in their own homes as a demonstrator.

Seventy per cent also knew how to cook and demonstrate electric ranges, and did so in their own home or on the display floor.

"In other words," says Mr. Mills, "these men had a knowledge of their product beyond that acquired from literature, sales meetings, and the usual forms of educational media.

"They understood the problems encountered in cooking; they could talk intelligently to the housewife about the benefits of electric cookery and could refute many of the incorrect surmises that creep into all prospects' minds. These salesmen were successful because 'experience bespeaks knowledge.'"

What approach do salesmen find the most effective? All of the men interviewed had carefully studied the method of their approach so as to leave a good impression of themselves and their company for a later interview if they were not successful in securing one at the time. Insofar as product was concerned, the two most outstanding features used in their approach were—1. Cleanliness, 2. Economy.

These successful salesmen not only sounded the appeal most popular with the consumer, but used a straight cold canvass approach and didn't use many of the subterfuges adopted by mediocre salesmen.

USERS MOST HELPFUL

Inquiry as to how prospects are obtained confirmed the "use the user" idea. Tabulation of the answers to this question follows:

How Attained	No. Men Reporting
Range Owners	95
Store Walk-ins	75
Refrigerator Owners	65
Friends	43
Cold Canvass	43

Does the husband participate in the purchase of the range? On the answer to this question hinged the decision of whether or not the company should consider his opinion in its sales literature. Answers were:

Always or usually	83
Frequently	14
Seldom	15

In the next instance, investigators asked users why they bought an electric range in preference to other types after they had become interested.

Here again more than one reason was given in several cases, but it was shown that 75.8% stated "cleanliness" as their chief reason for buying. Economy of operation was given in 26.1% of the cases, facility of use and time saving in 25.6%, and better cooking results in 20.6% of the answers.

It is interesting to note, says the Westinghouse survey, that such things as coolness, safety, healthfulness, etc., were not of as much interest to the women reporting as cleanliness of electric cookery, which three-quarters of them believe paramount.

Range salesmen were asked "What appeal do women respond to most when a salesman is selling an electric range?"

Once again "cleanliness" led the list in 74% of the answers, with "convenience" totaling 41%, "economy of operation" 20%, and "better cooking results" 10%.

These figures show, says Mr. Mills' report, that users and retail salesmen agree on the four main advantages of electric cookery, with economy of operation of more importance to housewives and convenience a better selling point for salesmen.

BUYERS' INCOME CLASS

Turning to electric range owners, Westinghouse's survey showed that almost 50% of the people who now use a Westinghouse range are in the skilled mechanic-clerical worker-salesman-farmer income brackets.

Experience of friends with electric cookery was stated to be the chief factor of influence in their making range purchases by 77.4% of the housewives interviewed. It was determined also that approximately 70% of these women have more than 10 years' housekeeping experience.

In developing its 1937 electric range line for the market, Westinghouse wanted to secure information from housewives concerning the product, best-liked features, desirable new features, and reasons why users selected electric ranges for their cooking needs, says Mr. Mill's report.

Fifteen experienced range men, instructed not to influence housewives' answers to a selected list of questions, were sent out into the field to conduct the survey. These investigators talked to 413 electric range users, 113 retail salesmen, 86 range dealers, 71 operating utilities, and 19 department stores in states throughout the country.

Care was taken, in selecting areas for the investigation, to survey territories offering a true cross section of actual field conditions, says Mr. Mills.

First the company wanted to know what income class was buying more electric ranges than any other. Results showed that people of moderate or below average incomes were making most of the purchases.

Users were divided into five "economic classes"—A, B, C, D, and Retired. Purchases of Westinghouse ranges among the five groups were divided as follows:

Class A—merchants, banking and financial men, and manufacturers—18.7%; Class B—professional men, executives, and public officials—25.1%; Class C—skilled mechanics, salesmen, clerical workers, and farmers—46.9%; Class D—unskilled laborers—7.8%; Retired—1.5%.

HOUSEKEEPING EXPERIENCE

One of the most significant revelations in the survey came in determining whether most sales were made to young or older housewives—whether brides and "up-to-date" housekeepers were buying more than the older generation of wood and coal-stove "experts."

Here it was found that exactly one-third of all sales were made to women who had kept house more than 21 years, and that the smallest purchasing group was the "bride" class—those of less than one year's experience. Therefore, according to the report, it was felt that experienced housekeepers recognized the advantages of the electric range. More than 70% had above 10 years' experience.

Division among users in this survey group was as follows, in years of housekeeping experience:

Less than one year—3.6%; one to five years—12.2%; six to 10 years—15.1%; 11 to 15 years—19.3%; 16 to 21 years—16.5%; more than 21 years—33.3%.

Next it was determined that 82% of electric range purchases were made by people whose homes had a rental value of $50 per month or less. Only 7% lived in homes with a monthly rental value of $75 or more. It was found that 71.9% of these users owned their own homes, indicating most purchasers to be substantial citizens according to the survey.

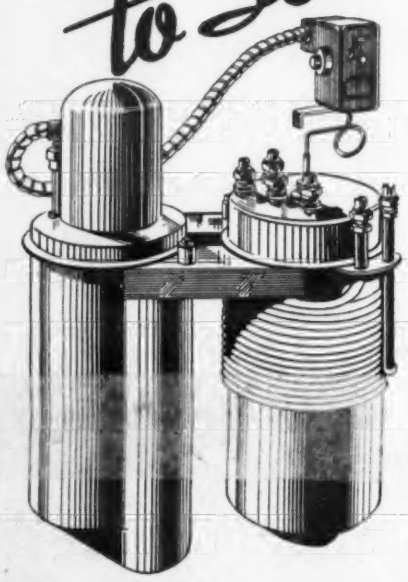
WHY OWNERS BOUGHT

More than half of all users—56.7%—answered that they had bought electric ranges for their homes because they "wanted them." Other reasons advanced were: "old range worn out" in 27.2% of the cases, "old range unsatisfactory" in 6.8%, and 9.3% bought electric ranges because of various other reasons.

In ascertaining "factors of influence," or how home makers first became interested in electric cooking, it was found that 77.4% of the housewives interviewed had been interested through experience of their friends. Some women gave more than one reason, but nearly eight out of 10 evidently saw an electric range in a neighbor's home.

COLTROL

Easiest to Sell



Because it has More Features

- Wherever beer is sold the Coltrol Liquid Cooler is the answer to the cooling problem and a sure-fire way to increase your sales and profits.
- It gives complete customer satisfaction because Coltrol enables a bartender to select the proper serving temperature and to control that temperature automatically with a variation of ±1½°, independent of the original compressor adjustment governing back pressures.
- With Coltrol you have perfect foam control, reserve capacity for peak loads, lower operating cost, water coil and up to 5 beer outlets from one cooler, easier installation, no surge tanks or two-temperature valves, and the only liquid cooler using electric refrigeration in which beer coils can be either steam or chemically cleaned. For all refrigerants.

SEE YOUR JOBBER OR WRITE DIRECT

COMMERCIAL COIL & REFRIGERATION CO.
457 NORTH ARTESIAN AVE.
CHICAGO, ILL.

Dial the Temperature You Want With

COLTROL
LIQUID COOLER

OTHER THINGS BEING EQUAL WHICH ONE WILL SHE CHOOSE?

SHE'LL buy the one that her judgment tells her is the better—the one equipped with a General Electric motor. She isn't going to take a chance on a make of motor she doesn't know, when one that she recognizes to be of high quality costs her no more.

Of course, the choice isn't as easy as that pictured, for two appliances are seldom so nearly alike. But the fact remains that buyers are strongly influenced by the sales voice of quality. Thus, G-E motors, because they have a reputation for high quality, give prospects added confidence in your appliances—amplify the voice of quality and make selling easier.

Today, millions of household appliances are equipped with G-E motors because these motors are designed and built to give lasting satisfaction. General Electric Company, Schenectady, New York.

HIGH-QUALITY FEATURES OF G-E MOTORS

Indestructible rotor—a one-piece cast-aluminum rotor winding that cannot become open circuited or burn out.

Resilient mounting—rings of live rubber isolate all motor vibration. Operation of the motor is almost inaudible.

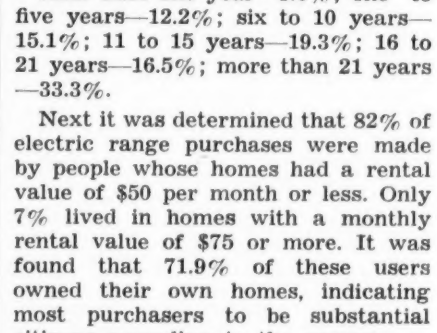
Protected windings—stator windings thoroughly bonded together and treated to resist heat, moisture, abrasion, and mild acids and alkalis.

Reliable centrifugal switch—positive-acting, quiet, and rust-proofed for long life.

LET G-E MOTORS HELP YOU SELL

GENERAL ELECTRIC 070-203

ANY TIME



ANY WHERE

You're always near a source of

Artic
REG. U. S. PAT. OFF.

(DU PONT METHYL CHLORIDE)

Prompt delivery in 20-, 60-, 90-, or 130-lb. cylinders from adequate stocks in principal cities.

DU PONT

E. I. Du Pont de Nemours & Co., Inc.
THE R. & H. CHEMICALS DEPT.
Wilmington, Delaware

ARTIC—*the preferred Methyl Chloride for Service Work*

Tourist Center Installs Range-Refrigerator Set

VALDOSTA, Ga.—Eight cottages equipped with General Electric LK-2-G-15 combination refrigerators and ranges are part of the home-away-from-home accommodations offered at Wimberly's Auto Court, novel tourist center located on the main Florida highway on the outskirts of this city.

Owned by Luther Wimberly, the tourist center consists of one large building, the first floor of which houses a complete automobile servicing station; the upper floor provides 48 hotel rooms with complete hotel service. This building is flanked by 38 cottages, each of which is equipped with a bath.

Combination range units are to be installed in additional cottages, according to Mr. Wimberly, who also plans to install General Electric water coolers in them.

District Managers Hear Hotpoint's Plans

CHICAGO—Sales and merchandising plans for Hotpoint appliances for the last half of the year were reviewed June 21 to 26 at the annual district managers' conference in the Little Theater of Edison General Electric Appliance Co., Inc. Ray W. Turnbull, vice president and general sales manager, was general chairman of the conference.

Reports on activities and accomplishments of various divisions of the company during the first part of the year were made by sales heads of these divisions: D. C. Marble, ranges; A. H. Jaeger, water heaters; Harry Mealey, refrigerators; G. W. Smith; home laundry equipment; Frank Denninger, dishwashers; and Grant Call, heavy duty.

Activities of the home economics department were outlined by Mrs. Mary Schwin, manager. W. A. Grove, advertising and sales promotion manager, reviewed advertising plans for the last half of the year.

District managers attending the conference included: M. H. Beekman; W. H. BonDurant; F. B. Williams, new manager of the southeastern district; L. E. Buxton; H. K. Dewees; A. W. Peterson; J. T. Nee; B. E. Rowley; J. C. Platt; C. P. Myrick; H. P. Greenwood, new New York district manager, and H. D. Conklin.

Branch Appliance Co. Opens New Store

WASHINGTON, D. C.—A new division of Branch Appliance Co. of Baltimore, Kelvinator refrigerator and appliance dealer there, has been opened here by Richard Willis.

A. Woodward has been appointed manager of the Washington branch, and W. N. Hoff of the main Baltimore establishment.

Best to Contact Dealers for W-M Refrigeration Co.

MILWAUKEE—Frank Best has been appointed state dealer contact man for the Copeland refrigeration line, which is handled here by W-M Refrigeration Co., manufacturer's agent for refrigeration, air-conditioning, and oil burner equipment.

Mr. Best joined Copeland Refrigeration Co. of Milwaukee in 1927, leaving after several years to enter the sales department of Wisconsin Telephone Co.

Westinghouse Opens Office In Huntington, W. Va.

HUNTINGTON, W. Va.—William Ives and Jack Steelman, sales and service managers, respectively, of the new distribution center of Westinghouse Electric & Mfg. Co. here, were hosts at the recent formal opening of this center.

The company's sales, service, and warehouse facilities are centered in this building, together with facilities of the Westinghouse lamp division and the Westinghouse X-ray company.

ASK FOR NEW BULLETIN 144C
"T" Series Thermo Valves
ALCO VALVE CO., Inc.
ST. LOUIS MO.

'Council for Improvement Of Specialty Selling' Plans Training Course

NEW YORK CITY—The Council for the Improvement of Specialty Selling, Inc. has opened offices here with James Maratta as managing director, to engage in counselling service on problems relating to the hiring, training, and direction of specialty salesmen, including preparation of special sales presentations and the use of sales tools.

A series of publication and training courses for specialty salesmen is planned for this summer and fall under Mr. Maratta's supervision.

J. R. Van Arsdale is the council's director of publications, and Frank Enger and Robertson Martin are specialists on direct mail and sales promotion, respectively.

Wholesale Radio Named Distributor for Apex

NEW YORK CITY—Wholesale Radio & Equipment, Inc. has been appointed distributor of all Apex products except refrigerators in the territory embracing Manhattan, Westchester, Staten Island, and New Jersey, reports John W. Walter, metropolitan sales manager.

MacCubbin Joins G-E's Home Bureau Staff

BALTIMORE — Harry S. MacCubbin, who recently resigned as appliance manager for the Baltimore branch of General Electric Supply Corp., has been appointed district representative for the home bureau division of General Electric Co., with offices at Philadelphia. His territory will include Maryland, District of Columbia, Pennsylvania, Delaware, and Virginia.

New Jersey Dealer Gives Unit in Local Contest

NEW BRUNSWICK, N. J.—Newton B. Smith, General Electric dealer, is offering an electric refrigerator as the first prize in a "Thrift Contest" merchandising plan being conducted here during July.

Hardware Dealer Plans to Concentrate on Appliances

ELGIN, Ill.—A. C. Juby & Son, Inc. has liquidated its stock of hardware and in the future will specialize in sales and service of household appliances, commercial refrigeration, air conditioning, warm-air heating, and sheet metal work.

Adequate Wiring Group Personnel Announced

NEW YORK CITY—Personnel of the National Adequate Wiring executive committee has been completed with appointment by Edison Electric Institute of M. E. Skinner of Buffalo, Niagara & Eastern Power Corp., Buffalo, and C. A. Eastman of Ebasco Services, Inc. here, as the committee's utility representatives.

The committee, whose purpose is to organize and direct a campaign to educate householders to recognize and meet their need for adequate electrical wiring, is composed of two representatives from each of the following organizations: National Electrical Contractors Association, National Electrical Manufacturers Association, National Electrical Wholesalers Association, International Association of Electrical Leagues, and Edison Electric Institute.

Besides the two recent appointees, committee members are: E. G. May and S. J. O'Brien, N.E.C.A.; W. E. Sprackling and G. C. Thomas, Jr., Nema; John L. Busey and L. E. Latham, N.E.W.A.; J. S. Bartlett and George R. Conover, I.A.E.L.

Cater Handles Westinghouse

MIAMI, Fla.—Cater Furniture Co. has been appointed Westinghouse dealer here.

Page-Williamson Staff Hear Kelvinator Men

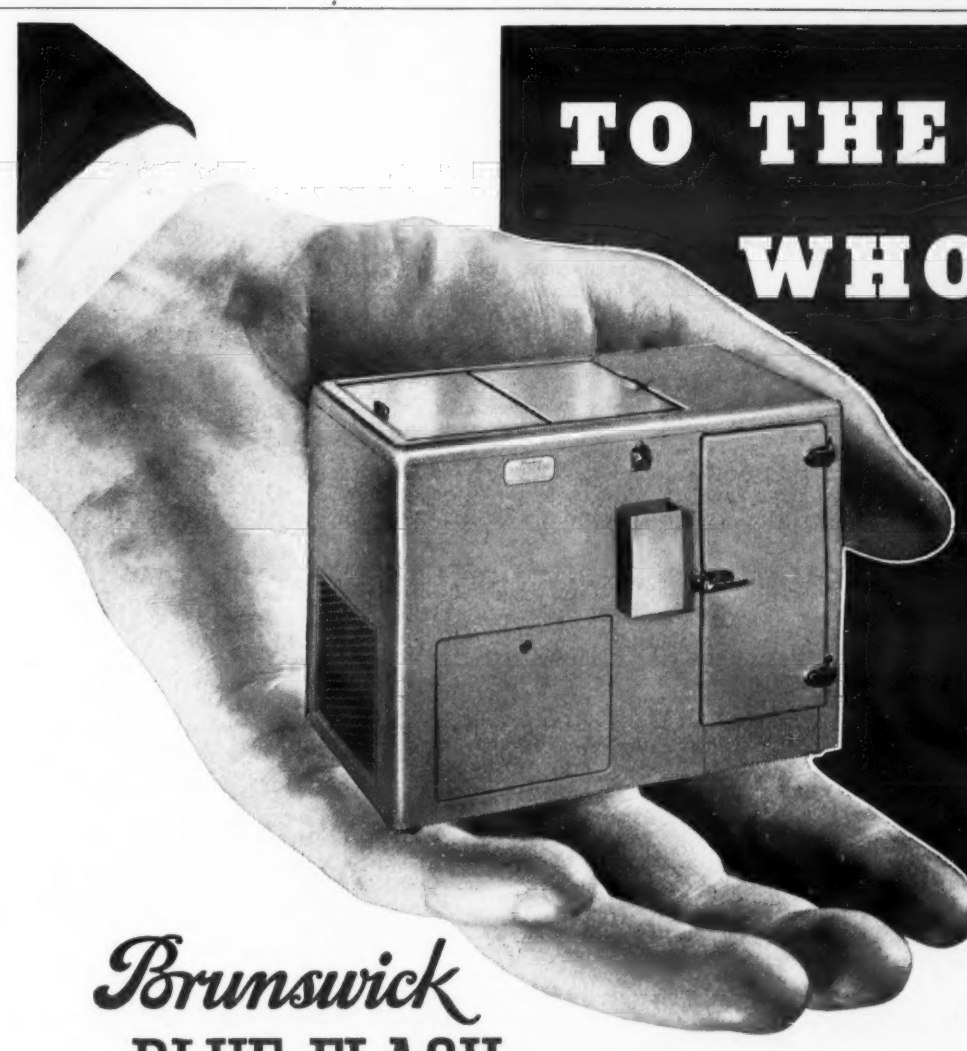
CHARLOTTE, N. C.—Executives and salesmen of Page-Williamson, Inc., Kelvinator distributor, attended a dinner and sales conference at the Page-Williamson display rooms here recently.

Talks were given by Jesse W. Page, Jr., general manager of Page-Williamson; Miss Lucille Stonnell, southeastern division home economist of the Nash-Kelvinator Corp.; George Eastman, range specialist; and Calvin D. Mitchell, Kelvinator district manager.

Rinehart Succeeds Bertke At Dayton Graybar

DAYTON—George Bertke, an employe of Graybar Electric Co. for the past 30 years, has retired on a a company pension and is now associated with Bertke Electric Co., electrical contractor in Cincinnati. At the time of his retirement, Mr. Bertke was in charge of Kelvinator sales for the local Graybar branch.

William Rinehart, of the Nash-Kelvinator Corp. sales department, has been appointed as Mr. Bertke's successor. Mr. Rinehart once spent three years in Kelvinator's Pacific coast organization, but comes to Dayton from his position in Chicago.



TO THE MERCHANT WHO'D LIKE TO PICK UP $5000.00 IN EXTRA VOLUME!

Brunswick

BLUE FLASH BOTTLED BEVERAGE COOLER OFFERS NEW SOURCE OF SUBSTANTIAL EXTRA PROFITS!

IF you want a brand-new source of extra profits, get all the facts about the Brunswick Exclusive Dealership proposition on the fastest-selling Bottled Beverage Cooler on the market—the famous BLUE FLASH.

No Stock to Carry! Very Attractive Discounts! Exclusive Dealership!

This three-purpose cooler has become tremendously popular with grocers, tavern, restaurant and delicatessen owners, confectioners, and druggists, because it has consistently increased sales and profits for all BLUE FLASH users who sell bottled beverages. With the exclusive BLUE FLASH Dealership, you can tap this huge market, make a good margin of profit; and do it *without* making a big investment or carrying a large stock.

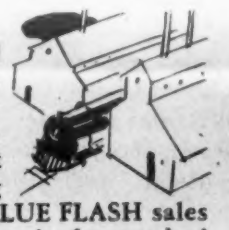
You Sell It on Easy Monthly Terms!

You don't even have to get a down payment when you sell a BLUE FLASH Cooler! You can guarantee immediate deliveries, and sell this wet *and* dry storage Cooler and Refrigerator on easy monthly terms. BLUE FLASH pays its own way in bottled beverage profits!

Powerful Selling Helps! FREE Advertising Plan and Materials

To help you sell BLUE FLASH COOLERS, we give you powerful, result-producing Selling Helps. In addition, you receive a proven Bottled Beverage Advertising and Merchandising program for you to offer FREE to your retailer-customers!

Over 92 Years of Engineering Experience!



BLUE FLASH Bottled Beverage Coolers are backed by a nationally-known $12,000,000.00 organization with almost a century of engineering experience. That's why BLUE FLASH sales have *tripled* this year! Get the facts today!

MAIL COUPON
GET FULL PARTICULARS AT ONCE

The BRUNSWICK-BALKE-COLLENDER CO.
Appliance Division A-2
625 South Wabash Ave., Chicago, Ill.

Of course I'm interested in a new source of extra profits. Send me full details of the Brunswick BLUE FLASH Bottled Beverage Cooler EXCLUSIVE DEALERSHIP. No obligation, of course.

Name.....
Address.....
Town.....*State*.....

The BRUNSWICK-BALKE-COLLENDER CO.
Established 1845
APPLIANCE DIVISION • 625 S. WABASH AVE., CHICAGO, ILL.

AIR CONDITIONING AND REFRIGERATION NEWS

Trade Mark registered U. S. Patent Office; Established 1926 and registered as Electric Refrigeration News

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Electric Range Sales Hit Stride

ELECTRIC RANGES provide some of the most exciting sales news in the appliance field today. No appliance, not even refrigeration, is showing such remarkable gains in volume.

In 1936 a total of 318,000 electric ranges were sold, with a retail value of $41,413,140, as compared with 1935 sales of 215,000 ranges valued at $27,305,000.

During the first four months of 1937 the electric range industry reports an increase of 55.7% in sales, as compared with the first four months of 1936. Wholesale dollar value is up 59.9% over 1936.

These comparisons, it should be noted, are with the years 1936 and 1935—which were all-time banner years for the range industry, far out in front of anything this comparatively old appliance business had ever done before.

Three Chief Reasons For Long-Awaited Results

A number of reasons can be assigned for the causes of this highly satisfactory development. Chief among them, perhaps, is marked mechanical improvement in design and performance of electric ranges. Second is the important and wise decision of range manufacturers to put their distribution into the hands of specialty selling outlets, the dealers who had put refrigeration over in so unprecedented a fashion. Third comes the tie-in with electric kitchen promotion.

Electric ranges, which were on the market long in advance of electric refrigerators, lagged behind the latter in sales progress as well as making a poor comparative showing with washing machines, vacuum cleaners, and radios. Two reasons for range merchandising stagnation are generally named: the keen competition of gas ranges, which for a long time were considered faster and more economical; and lack of promotion.

Electric Ranges Made Fast, Economical, Attractive

Eventually, however, several manufacturers who had made a success of electric refrigerators began to go to work in earnest on ranges. Their laboratories stepped up the speed of electric ranges until they matched that of the gas variety. Then they worked on economy until they achieved results which are said to make cooking by gas comparatively expensive.

They streamlined and dolled up their ranges. This step was also taken by the gas range makers. Two advantages had the electric type, however, with which the gas cooker could not compete: the electric range is cooler, making summer cooking more pleasant; and it is safe. Latter theme—which would probably be most effective—has never been employed in promotion, because of a feeling that it would not be exactly gentlemanly.

Specialty Selling Dealers Put the Range Over

Manufacturers of gas ranges still depend on utilities, hardware and furniture stores to do their selling. And there is where the manufacturers of the electric type really get their collective foot into the door. They are now merchandising through the best specialty selling dealers in the world.

When General Electric and Westinghouse began giving their refrigerator dealers ranges to sell a few years ago, the electric range industry began to come of age. Sales jumped amazingly. Other refrigerator manufacturers came along with ranges, too; or effected loose distributing tie-ups with existing range makers.

For results, see paragraphs two and three of this editorial.

Selling the All-Electric Kitchen Step-by-Step

Merchandising theme which these specialty selling outlets have employed so effectively is the all-electric kitchen. This idea *sounds* good to householders. Electricity means modernity. It means safety and cleanliness. And the manufacturers have helped these pride-of-possession ideas along by ensemble designing, which has turned the kitchen into the most modern and striking room of the house.

Kitchen planning came along, with experts who could show the housewife how to save steps and energy. These planned kitchens sold a lot of appliances—refrigerators, ranges, dishwashers, fans, radios, and small appliances. But for a while this market was limited to those of considerable means.

And then the indefatigable specialty dealers started to work selling all-electric kitchens on the chain plan—an appliance a year, just as young girls acquire charms for their bracelets. As soon as the payments on one appliance began to run out, they persuaded the home owner to install the next appliance (usually the range followed the refrigerator). This appliance was matched in design with the first.

In easy steps, then, the prospect of moderate or small income can now acquire a modern, step-and-labor-saving, economical, all-electric kitchen. The idea is going over with a bang. And it's the best merchandising stimulus electric ranges ever had.

At first range salesmen stressed the health and cleanliness aspects of electric cookery. These are still said to be the most effective arguments. But not satisfied with dependence on these points, whole groups of them have learned how to cook.

Taking a leaf from the home economists' notebook, these salesmen are now able to make an electric range demonstration which will make a husband's mouth water, give the jaded palate's of housewives—whose greatest single problem is something new to serve—a stimulus which is the first step toward a sale.

Specialty selling, and specialty salesmen, are hard to beat.

QUOTED

Air Conditioning Defeats Hot Weather

Americans are discovering more and more that, by looking around for air-conditioned spots, they can go a long way toward licking the hot weather. And the fact that the theaters, restaurants, railways, hotels, bars—even beauty parlors and dentists' offices—that are equipped with air-cooling apparatus are grabbing a bigger share of patronage, has given the industry a tremendous boost this year. During several months sales of air-conditioning equipment were treble those of the 1936 comparatives.

During the first four months of 1937 the members of the Air Conditioning Manufacturers' Association, 11 leading companies, sold equipment with an installed cost of $41,000,000 against $14,756,992 for the similar 1936 period, an increase of 180%. Last year the $41,000,000 mark was not reached until October.

While the competition of public places bidding for customer patronage has given air conditioning its initial push, advances in engineering have brought down the cost of small portable units for the home and small shops, and now this branch of the business is uncovering a rapidly increasing demand.

The ingenuity of engineers is discovering constantly broadening industrial uses, where temperature and humidity control are increasing profits.

What brought the bankers up with a round turn was their discovery that the industry could aid them with distressed real estate and languishing businesses. Loans for air conditioning are now more readily forthcoming, it is reported.

Hospitals are installing air conditioning equipment both for patients and physicians. In operating rooms, surgeons and nurses work in far greater comfort on warm days and presumably with less chance of making slips. And in connection with prematurely born infants, it is reported that the death rate has been reduced materially through air conditioning.—*New York World Telegram.*

Air Conditioning Goes Ahead

AIR CONDITIONING is comparatively new as a commercial enterprise, but it is getting into the class of big business. Adolescent children can remember when the electric or palm leaf fan, a cool pitcher of lemonade, and possibly a secluded corner of the basement comprised the only air conditioning available in summer.

Then came the "streamline" age, with comfort second to speed as the desired goal. Somebody put a cake of ice in his automobile and fanned it with an electric gadget. The result was solid comfort amidst torrid heat.

From that time on development in air conditioning has been rapid, and installations in homes, factories, and business offices will break all records this year. For the first four months of 1937, the members of the Air Conditioning Manufacturers' Association had sales aggregating $41,311,301.

It proves that the country has become conscious of the need for comfort, and is turning to artificial means of achieving it, instead of depending on the weather man, who hasn't performed so well in recent years.—*Topeka, Kan. Capital.*

LETTERS

A Distributor Testifies On Dep't Store Selling

Stern & Co., Inc.
Distributors of Electrical Specialties
210 Chapel St., Hartford, Conn.
July 6, 1937

Editor:

Although I am addressing this to you, friend George, I realize that you are away from the plant but that someone in the Editorial Department is going to get this letter. I wish to comment most favorably upon your editorial of June 30, entitled "The Shoe Is On The Other Foot."

I might state that we have just gone through our most successful year of refrigeration, having handled the Grunow for many years. Our prices are higher than competition, and we have found that our dealers have all made profits in the sale of Grunow refrigerators, because the dollar profit per unit is what counts in the final analysis.

Our department store activity has been nil. Those department stores that we do have complain of discounts, and of high list prices. They are about as inconsistent in their plaints to us as they seem to have been at the Association meeting. We have found that those department stores which merchandise with outside crews are doing a universally good job, and from the managers of these various departments I understand they are making money. Naturally we would like to have more department stores, because they are outlets for large quantities of merchandise and are generally of unquestioned credit standing.

We are, therefore, delighted to know that the department store is beginning to realise that the higher price is essential to a profit in operation. The lowest priced box which we had for sale all year was a five foot box, which, including the five years warranty, retailed for $159.50.

FRANCIS S. STERN, President.

An Invitation from Mayor Knaggs

Mayor's Office
City of Monroe
Monroe, Mich.
July 6, 1937.

Editor:

Your editorial in your AIR CONDITIONING AND REFRIGERATION NEWS of June 23 was very carefully read.

I want to state that I consider this one of the finest of any editorials that it has been my privilege to read. It seems to be right to the point. While possibly it was very flattering to me I am very susceptible to flattery as most every one is.

I think we won our battle here and it looks to me as if the CIO, at least as far as the Steel industry is concerned, is on the downward grade fast.

Editorials such as yours do a lot of good, so keep up the good work, as I know you will. And if ever you are in Monroe would be very pleased to have you call at my office for a nice visit. D. A. KNAGGS, Mayor.

Sold—Another 'Around the World' Book

Metropolitan Edison Co.
Domestic Sales Department
Reading, Pa.
July 8, 1937.

Editor:

I have tremendously enjoyed your "Around the World" series, and was pleased to learn from the June 23 issue of REFRIGERATION NEWS that you plan to publish a book covering your travels. I would be delighted to have a copy of this book in my possession. Will you please furnish me with the necessary information as to how I may obtain a copy.

ETHEL M. DERRICK.

Our Own Testimonial on Benefits of Conditioning

The L. W. Ramsey Co.
Advertising
111 East Third
Davenport, Iowa

Sirs:

We have a special favor to ask of you.

We are getting out a sales manual on air conditioning for our client, The Herman Nelson Corp. Now in this book we would like to include a statement from you testifying to your experience with air conditioning, and would appreciate it very much indeed if you would extend us this courtesy.

We would in no way intimate that you use the Herman Nelson system. We just want to show what air conditioning does, how it increases efficiency and reduces illness—and your statement would refer to air conditioning in general.

E. BURMEISTER

Answer: You are welcome to use all or part of the following statement regarding the air-conditioning installation of Business News Publishing Co.:

"In our business of publishing a weekly trade paper, salaries and wages represent nearly one-half of our total expense. We have about 50 employes in our offices and shop and most of their work is in the nature of *mental* activity, but mental alertness and productivity is definitely and noticeably affected by physical comfort.

"Therefore, we do not need any scientific measurements to arrive at the conclusion that the output of our employes is improved by providing cool, dry, clean air throughout the summer as well as warm, moistened air during the winter.

"This is the third summer that our employes have enjoyed the comforts of air conditioning. Now we get full productivity in our offices no matter how hot and humid it may be outdoors. There is no question in our minds that the cost of air conditioning is justified in terms of what we get in return for the payroll.

"We have found that winter air conditioning is equally important. One of its most noticeable effects in our office has been the practical elimination of colds. The continual circulation of fresh, filtered and moistened air through every room seems to prevent colds even though most of our employes have the benefit of air conditioning only about eight hours out of every 24.

"One of the big advantages of our all-year-around air-conditioning system is the elimination of outdoor dust, soot and other impurities. Desks are not covered with dust and grit. It is no longer necessary to put covers on typewriters and dictaphones. Thousands of automobiles pass by. We see them but do not hear them because double windows are kept closed the year around."

F. M. COCKRELL

Survey Informative

The Cooling Tower Co., Inc.
15 John St., New York City
July 6, 1937.

Editor:

Thank you for sending us a copy of the book entitled "Air Conditioning Survey." This looks interesting and seems to contain a lot of very valuable information.

A. A. MORSE, Sales Manager.

They're Pleased

Garfield, Utah
July 2, 1937.

Editor:

Received Volume No. 1 of the MASTER SERVICE MANUAL some time ago and am very well pleased with it. Am eagerly looking forward to receiving MANUALS 2 and 3 and hope that they will soon be ready for distribution.

You will soon receive my order for REFRIGERATION AND AIR CONDITIONING SPECIFICATIONS. HARRY G. DISSINGER.

2422 West 17th St.
Little Rock, Ark.
June 17, 1937.

Sirs:

Having taken a two week's refrigeration course at Coyne Electrical School and upon completion buying your MASTER SERVICE MANUAL, wish to say that it is undoubtedly the greatest help for a service man.

DAN HARRELL.

1733 168th St.
Moneta, Calif.

Sirs:

I would like to get Volume 6 Commercial Refrigeration Service Manual (by K. M. Newcum) as soon as possible; also Volumes 7 and 8 as soon as they are published as the Volumes 3, 4, and 5 that I have are a great help in finding out what I wish to know in a hurry.

WILLIAM J. BAILAR

Missed

Lucas-Kidd Motor Co.
Anderson, South Carolina

Sirs:

Some time ago, I subscribed to REFRIGERATION NEWS, and would like to renew my subscription, as I miss the worthwhile information that I always found in the columns of this up-to-the-minute paper.

I have changed my address however, and I want this new subscription to come to me at my new location. The firm's name is Rice-Cleveland Norge Co., 22 S. Laurens St., Greenville, S. C. H. R. KIDD.

Use of Air Conditioning in Medical Test Rooms Outlined by Mayo Surgeon

SCHENECTADY — The way in which medical research and air conditioning aid in solving each other's problems was graphically shown a group of scientists in the General Electric research laboratory here recently—by Dr. Charles Sheard of the Mayo clinic and foundation, Rochester, Minn.

Fingers, toes, legs, and arms are the thermostats in nature's air-conditioning system for the human body, said Dr. Sheard. They regulate the dissipation of heat from the body in order that heat loss may equal heat production, thereby maintaining a constant internal temperature.

To further his investigations, equipment has been installed in three psychrometric rooms at Rochester which, by maintaining controlled levels of temperature and humidity, has been instrumental in obtaining valuable data concerning human comfort.

TEST ROOM CONDITIONS

The rooms are equipped with apparatus capable of maintaining environmental temperatures within 1° F., plus or minus, and humidity within 3%, plus or minus.

These rooms are used to investigate basal metabolism effects produced by sudden changes in environmental temperature on the skin temperatures of various regions of the body, together with effects produced by ingestion of food, exercise, or change of posture.

Thermocouples are fastened to the subject's great toes, knees, middle fingers, wrists, and forehead with adhesive tape, and the lead wires so arranged that the subject can easily and quickly be moved from one room to another. Temperature readings are made by an operator at a central switchboard.

Dr. Sheard pointed out that the constancy of the body's internal temperature is maintained in the face of rather wide variations in environmental conditions and the body's production of heat.

FINGERS AS THERMOSTATS

Rising temperatures, he said, indicative of the body's giving off heat to keep its internal heat constant, are generally found first in the fingers. Falling temperatures, indicative of the body's conserving heat, are first found in the toes.

Skin temperature in any area is determined both by the heat brought to the skin by the blood and the heat the skin loses by the various dissipative process.

The two chief factors in controlling skin temperature—and the comfort sought through air conditioning—are, therefore, the amount of heat that must be lost to maintain constancy, and the temperature and humidity of the environment into which this energy is to be dissipated.

Dr. Sheard confirmed the fact that the rate of change in environmental conditions, rather than the change itself, was important to human health, since internal regulating mechanisms require time in which to make their adjustments.

In order to bridge more effectively the gap between practical air-conditioning tools and the conditions set up by the human body under various environmental conditions, Elliott Harrington, commercial engineer, and other officials of General Electric's air-conditioning department recently spent several days in Dr. Sheard's test rooms in Rochester, studying their own reaction charts.

Westinghouse Contracts For '39 Fair Space

NEW YORK CITY—First formal contract for exhibit space in New York's world fair of 1939 has been signed by Westinghouse Electric & Mfg. Co., according to Grover Whalen, president of the fair.

The contract calls for 10,922 sq. ft. of floor space in the Electrical Production building at the scale price of $152,908, and was signed for Westinghouse by D. S. Youngholm, vice president.

It is said that the Westinghouse display will constitute a scientific presentation of the way in which the company's research and development work during the last 50 years will effect mankind in the half-century to come.

Demonstrations are planned to include latest research methods and most recent applications of electricity to every form of human endeavor.

Stevens Joins Kelvinator Baltimore Branch

BALTIMORE — W. A. Stevens, formerly service manager of R. F. Trant & Co., Frigidaire distributor at Norfolk, Va., has been appointed manager of the engineering and service and installation departments of the Baltimore branch of Kelvinator division of Nash-Kelvinator Corp., reports Branch Manager D. A. Dimitry.

Prior to his connection with the Trant organization, Mr. Stevens was service manager of the Frigidaire Baltimore branch office.

Reorganized Plumbing Shop Handles Refrigeration

INDIANAPOLIS — Rich & Co., founded in 1888 as a plumbing shop, has undergone reorganization and now handles Grunow, Crosley, and Electrolux refrigerators.

Officers of the reorganized company are: J. Paul Rich, president; Forest Dicks, sales manager; Marshall Alexander, office manager; Devard A. Venable and Emmett Alexander, co-managers of the appliance service department.

New C. I. T. Office Opened In Asbury Park, N. J.

ASBURY PARK, N. J.—C. I. T. Corp., sales finance company, has opened a new office in the Electric building here, with G. F. Brickman, formerly with the Newark office, in charge. Associated with him as dealer and manufacturer contact men will be F. W. Brown and E. G. Burke.

The new Asbury Park office will handle financing of automobiles and major appliances for dealers in Monmouth and Ocean counties.

Six New Distributors Appointed by Climax

INDIANAPOLIS—Appointment of six new distributors for Climax room coolers has been announced.

The distributors are: Federal Distributing Co., Kansas City, Mo.; Gambill Distributing Co., Nashville, Knoxville, and Chattanooga, Tenn.; Machine Tool and Supply Co., Tulsa, Okla.; Old Faithful Heater Co., Chicago; Orient Air Conditioning and Commercial Refrigerating Co., Jersey City, N. J.; A. A. Uhalt, Dallas.

THE LIGHTWEIGHT
ALL-STAMPED STEEL BASE
CONTRIBUTES TO

BRUNNER RUGGEDNESS

Throughout the many years of continuous service built into this Brunner condensing unit, its all-stamped steel base—with no seams to weaken or spread—completes the all'round ruggedness of the unit itself. This particular type of base also safeguards each Brunner unit against breakage in shipment. * * * You'll find some Brunner feature, like this particular one, excelling in every phase of manufacture. Counter-balanced reciprocating parts, for example, machined to close tolerances reduce vibration and wear to a new low... positive "Brunner-seal" insures constant crankcase pressure... special valve-in-head design simplifies valve replacements—these and scores of other Brunner advantages team up to deliver low-cost refrigeration dependably. * * * Let us explain in detail Brunner refrigerating and air conditioning equipment—forty-seven condensing units and five compressor models in a range from ¼ H.P. to 15 H.P. Brunner Manufacturing Co., Utica, N.Y., U. S. A.

BRUNNER

BUILDS FOR *Greater* DEPENDABILITY

Everywhere these bottles are filled there is a need for TEMPRITE Bottling Plant Water System

Features:

1. More Gallons Per Dollar Invested
2. Exact Capacity Selection.
3. Small Size—Large Capacity.
4. Accurate Temperature Control.
5. Perfect Sanitation.
6. Close Coupled Installation.

Cost of refrigeration is lower—carbonation losses are reduced. Operation is facilitated.

TEMPRITE 70° 40° INSTANTANEOUS

TEMPRITE PRODUCTS CORPORATION
1349 East Milwaukee Ave., Detroit, Mich.

ORIGINATORS OF INSTANTANEOUS LIQUID COOLING DEVICES

Baltimore's Tonnage For 1st Four Months Doubles Last Year's

(Concluded from Page 1, Column 1)

It was estimated by the utility that approximately 47 self-contained room coolers have been installed in Baltimore during the period.

Installations made and contracted for during the four-month period practically doubled a total of 1,151 hp. placed in operation during the first half of last year.

Unofficial estimates arrived at by the utility's Air Conditioning Bureau place the total number of installations, exclusive of self-contained units, for the first six months of this year at 61, totaling 2,427 hp. This figure would represent a net gain in horsepower of 51.4% over the 1936 total.

One of the largest installations made during the period was a department store job of 303 hp. in the building of Hochschild, Kohn & Co.

This is believed to be the largest direct-expansion Freon installation now in operation in this country. It was designed by C. S Leopold, consulting engineer of Philadelphia.

Other large commercial installations included one of 497½ hp. in the Hutzler Bros. department store, a 237½-hp. installation on the store of J. T. McCrory Co., and a 104-hp. system in the W. T. Grant & Co. department store building.

Over 400 air-conditioning installations are now in operation in Baltimore, the utility's records show.

Sales in May of Air Conditioning Equipment Total $6,472,804, Nearly 50% Higher Than May, 1936

Item	Value of Orders Booked May 1937	May 1936	Total, 5 Mos. Jan.-May 1937
Total	**$6,472,804**	**$4,650,681**	**$31,420,627**
Air-Conditioning Group—Total	**$3,598,802**	**$2,779,564**	**$18,587,781**
Unit Systems—			
Self-contained (shipped substantially complete)	835,541	546,250	3,380,251
Not self-contained (shipped in sections), including refrigerating or cooling medium	832,975	899,328	4,672,208
Central-station Systems, excluding installation if installed—			
Human comfort (including refrigerating or cooling medium sold separately or otherwise for air conditioning)*	1,104,603	709,388	6,750,677
Industrial (including refrigerating or cooling medium sold separately or otherwise for air conditioning)*	136,742	75,403	480,237
Refrigerating or cooling medium sold to contractors, or other distributing outlets (not manufacturing air-conditioning equipment) for air-conditioning systems, when such knowledge as to the application is available	364,145	364,789	1,827,805
Air washers, including pumps and motors and control where furnished	119,987	85,879	488,620
Air filters (not including sales of filters used with machinery other than fans)	38,673	25,361	164,592
Humidifiers	166,136	73,166	823,391
Fan Group—Total	**$2,108,469**	**$1,307,127**	**$ 8,531,893**
Fans, including bearings, pulleys or couplings (if furnished)—			
For public and semi-public buildings	212,237	163,160	964,193
For general industrial uses	545,766	380,488	2,675,793
For mechanical draft	402,532	98,420	1,442,255
For jobber stocks and unknown uses	303,372	96,834	745,478
Small housed and propeller fans—			
Direct connected small housed blowers with motors and control (merchandise motors)	150,592	134,362	733,023
Propeller fans, direct connected and belted (for ventilation only)	402,232	367,026	1,392,216
Driving mechanism for general fan use (not reported above)—			
Electric motors and controllers(manufactured or jobbed)	85,010	63,324	485,038
Steam engines (manufactured or jobbed)	6,728	3,513	93,897
Steam turbines (manufactured or jobbed)			
Unit Heater Group—Total	**$ 765,533**	**$ 563,990**	**$ 4,300,953**
Industrial Type Unit Heaters, including heating element and motors where furnished—			
Equipped with blower-type (centrifugal) fans	140,248	74,317	702,573
Equipped with propeller-type fans	299,183	158,378	1,529,652
School Room Type Unit Heaters, including heating element and motors and control where furnished	78,492	196,048	594,943
Indirect Heating Surface (not including unit heater surface)—			
Steel pipe coil type (manufactured or jobbed)	....	1,242	20,471
Cast iron type (manufactured or jobbed)	8,746	5,546	53,522
Copper or aluminum type (manufactured or jobbed)	238,864	128,459	1,399,792

*Includes incidental equipment, such as temperature, motor, humidity, and electrical controls, dampers, outlets, etc., as are sold with each.

Where Air Conditioning Systems Were Installed in Baltimore Area During First Four Months of 1937

BALTIMORE, MD.
Air Conditioning Installed and Contracted for, Jan. 1 to April 30
(Data Furnished by Consolidated Gas Electric Light & Power Co.)

Type of Establishment	Make	Hp.
DRUG STORES		
Kriger's Drug Store	Delco-Frigidaire	11½
DEPARTMENT STORES		
The Hub (2)	Carrier	80
J. T. McCrory Co.	Rapp Eng. Co.	237½
W. T. Grant & Co.	Hitchens Eng. Co. (N. Y.)	104
Hutzler Bros.	Various	497½*
Hochschild, Kohn & Co.	Frick	303
FOOD STORES		
Schreiber Bros.	York	16½†
Nate's Delicatessen	Norge	10
INDUSTRIAL		
Noxzema Chemical Co.	Carrier	34
THEATERS		
Ritz Theater	Carrier	72
Vilma Theater	Carrier	32
Grand Theater	York	100
Eureka Theater	York	38
BANKS		
Fidelity Trust Co. (banking space)	Carrier	50
SHOE STORES		
Wyman's	Carrier	17
Thom McAn	Carrier	6
Regal Shoe Co.	Airtemp	6
5 & 10¢ STORES		
Silver's	Sperry Products, Inc. (N. Y.)	60
Schulte-United	J. H. Bodinger Co.	70
AUTO SUPPLY STORES		
Pep Boys	Raymond Rosen (Philadelphia)	8½
MEN'S WEAR STORES		
Isaac Hamburger & Sons	Carrier	73
Henry's	Carrier	9
WOMEN'S WEAR STORES		
Maison Annette	Carrier	9
Moses Kahn & Sons	Carrier	9
Lane Bryant	Carrier	75
RESTAURANTS		
Bilger's Restaurant	Carrier	8
B. G. Sandwich Shop	Carrier	16½
Dubner's Restaurant	Kelvinator	12
Bickford's, Inc.	Owner	8
Nicholson's Restaurant	Delco-Frigidaire	3
John R. Thompson (2 locations)	General Electric	42
Oriole Cafeteria	York	23†
PRINTERS		
Waverly Press	York	50
BOWLING ALLEYS		
Recreation Center	Carrier	22
AIR CONDITIONING SALES		
Air Conditioning, Inc.	Carrier	5‡

*—65 hp. during 1936. †—Additional. ‡—Approximately 47 room coolers installed during the period; total horsepower not shown.

Refrigerating unit installed in ice cream truck. There are six grades of Capella Oils... with proper viscosities for your requirements.

BIG RESULTS FROM all 6

BECAUSE they are sealed, the oil used in air conditioning and refrigerating units must be carefully selected . . . if they are to give uninterrupted service.

To give this top performance, Texaco now offers six different grades of Capella Oil. All six oils have a dielectric strength of 25,000 volts. All six are completely dehydrated so that coils will not corrode nor regulating valves freeze.

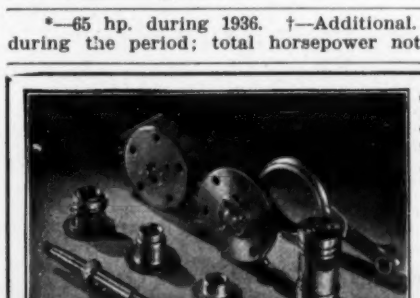
These six Capella Oils have unusually high stability. They do not react to refrigerants. Their low pour point prevents them from congealing, assuring mechanism working freely at all times.

Charge your units at the factory with one of these six Capella Oils. Ask your dealers to continue their use.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Refrigeration Lubricants. Prompt deliveries assured through 2020 warehouse plants throughout the United States. The Texas Company, 135 East 42nd Street, New York City.

TEXACO

REFRIGERATION LUBRICANTS



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Refrigeration Parts
are Certified to Excel

Ask for catalog covering complete line of Compressor Parts, Valves, Condensing Water Regulators, and Fittings

PERFECTION REFRIGERATION PARTS CO.
HARVEY, ILLINOIS

FOREIGN TRADE

Hongkong Market Opens Up As Servants' Demands Force Housewives to Work

By John Strohm

John Strohm, author of this article, was reared on a prairie farm located between Marshall (pop. 2,200) and West Union (pop. 800), Illinois. After graduation from the University of Illinois, where he was chief news editor of the Daily Illini, he spent a year editing a house organ for the Owens-Illinois Glass Co.

Now he is on an irregular tour of the world, writing his impressions for a number of newspapers, and interviewing refrigeration distributors for AIR CONDITIONING AND REFRIGERATION NEWS. Another of his articles will appear in an early issue.

HONGKONG, China—A picture of a vast market for refrigeration extending from north China down to Singapore with the free port of Hongkong as a distributing base, was painted for the writer in bold strokes by H. C. Best, manager of Refrigeration Service, Ltd.

And Mr. Best should know what he's talking about—his father was Scotch, his mother Cantonese; he speaks Malay and half a dozen Chinese dialects; he's lived in the Orient all of his life with time out for a couple of visits to the United States to keep in touch with American methods; and he's been interested in refrigeration as salesman and engineer since 1908.

His reasoning: the average distributor and dealer in the Orient is a poor man—unable to import a number of different models, unable to stock the necessary supplies and appliances for immediate use. Many times customers must wait—a dangerous thing, for "customers are endowed with changeable minds ordinarily confined to women," Mr. Best explained.

GOOD DISTRIBUTING CENTER

His dream is for sufficient capital to set up a large distributing depot in Hongkong, a duty free port for everything except liquor and tobacco. This company would handle and promote one reliable make of refrigerator, but would also carry a complete stock of parts for all refrigerators.

Small dealers from Peiping to the tip of Malay would act as agents. Each month they would get a complete stock list of all equipment and supplies carried in the distribution depot. Delivery would be a matter of days—not weeks as now when they must order in small lots from the United States.

The dealer would pay cash, but nearness to a ready supply would mean he could operate on a relatively small capital. And money is not exactly plentiful here. In fact, in Chinese funeral processions, the priests must use fake paper money to bribe the evil spirits to let the coffin pass.

If such capital were available, Mr. Best would want only one man from the United States—to keep the accounts. Being a trained engineer as well as one versed in Oriental selling methods, he would take over the promotion and engineering work. Salesmen in the States are fine—in the States.

The big profits are in commercial refrigerators. But he is convinced the household unit will come along, only more slowly. He says there is soon going to be a big demand for cheap refrigerators in the interior of China.

WOULD IMPORT PARTS

His plan would be to import the motors, compressors, and cabinet liners—then assemble the complete units in Chinese territory. Reason: there is a 5% duty on machinery imported into Chicago, but this duty is boosted to 30% if the motor is placed in a refrigerating unit.

Mr. Best, who handles Leonard and Lipman equipment, rents new and rebuilt refrigerators mostly to army men stationed here for a short period, and also to those who want a try before they buy. Renters are frequently buyers.

Monthly rental fees range from $7 Hongkong money ($1 U.S. = $3.25 HK) for a 4-cu. ft. second hand box to 16HK for a new box of 10-cu. ft. capacity. For a second hand 7-cu. ft. refrigerator he gets $8HK; $9HK if it's rebuilt; and $13HK for a new one.

Contracts usually run for a year, and the renter must pay $15HK to cover the cost of delivering, installing, and returning the refrigerator. The company services the machines and keeps them in perfect running order with capable service men ready to go to the rescue at any hour.

Mr. Best is enthusiastic about his rental plan.

"The way to sell refrigerators is to get them in the home where they sell themselves," he asserted.

The Hongkong refrigeration business received a set-back while still in its infancy because of lack of qualified service men. When a box went bad, a screw driver mechanic using locomotive repair methods seldom improved either the running condition of the machine or the temper of the owners, he complained. However, confidence in refrigeration has returned.

HOUSEWIVES GOING TO WORK

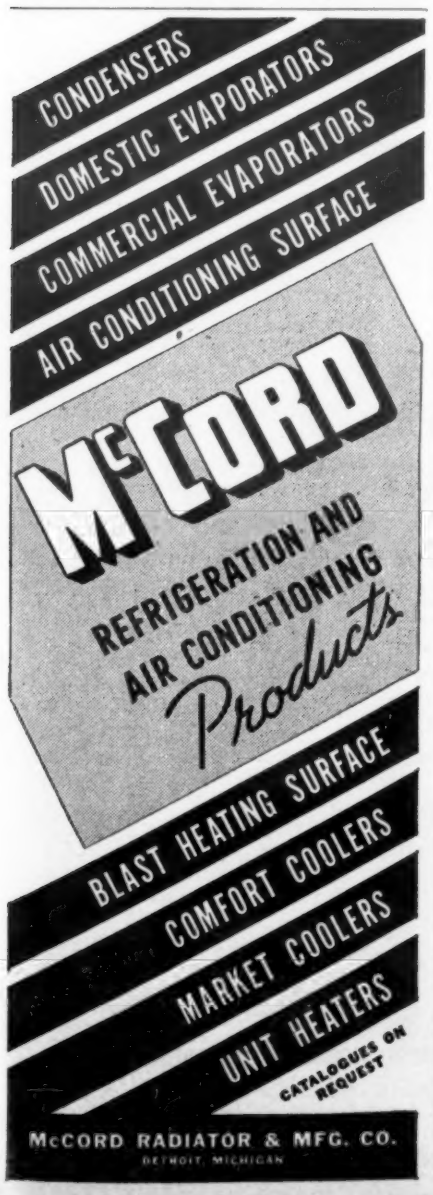
The electrical appliance market is just opening up because Chinese servants are getting a Western slant on the matter of salaries. Whereas 15 years ago a person could staff his house with eight servants for $50HK a month, it now takes $20HK to get a good cook and handyman. As the housewife turns to work, she must and will have those handy gadgets which will enable her to keep the house clean, the husband pacified, and her date with the bridge club.

Insulation should really be about 4 inches thick for use in the Orient, he thinks.

Dripping wet Hongkong citizens are ready to jump at air conditioning and dehumidifying. Three days before Mr. Best was interviewed he sent out an advertising circular on which this note was included:

"DEHUMIDIFIERS — Portable Room Coolers and Air Conditioners. Supplied or Built to Order." Two days later his telephone set up a constant clamor as sweating citizenry asked for details. He builds portable room coolers for 1,000-cu. ft. rooms, powered by a ⅓-hp. motor, for about $100 gold (U. S. money).

The AIR CONDITIONING AND REFRIGERATION NEWS he thinks is a paper which he could not do without. "I've grown up with that paper, keeping abreast with the industry and United States' methods. I'm ordering a set of all the publications they put out, too."



Honolulu Dealer Observes 32nd Anniversary

HONOLULU, Hawaii — Thayer Piano Co., Kelvinator dealer, recently held open house to celebrate its 32nd anniversary. Extensive remodeling had previously been completed.

Founded by the late Leonard E. Thayer, the firm is now headed by his son, Arthur F. Thayer.

Dry-Ice Journal Published In German and English

BREGENZ-LOCHAU, Austria—The Dry-Ice Journal (or Das Trockeneis as the German edition is known), monthly organ of International Research Society for the Application of Dry-Ice published by Dry-Ice Advisory and Press Service, is devoted exclusively to the progress and development of the dry-ice industry.

Editorial content of the journal includes articles on new processes or developments in the manufacture of dry ice, and the varied uses to which this product can be put.

Six hundred copies of each issue are printed, 300 being printed in German and the remainder in English. The journal, German version of which is over five years old, claims a circulation in 58 countries.

Dr. Bauer, of Bad-Imnau, Germany, is editor-in-chief; Paul Christian, of Horb a. N., Germany, is printer and editor.

All communications should be addressed to the journal's new address at Bregenz-Lochau, Austria.

Javanese Health Official Studies Air Conditioning Here

BATAVIA, Java — A potential market for air conditioning seems on the verge of opening up in the Netherland Indies, reports U. S. Trade Commissioner Donald W. Smith. An evidence of this is the recent departure of Prof. Dr. Mom, chief of the experimental station of the public health department at Bandoeng, for the United States to study the developments in air conditioning there.

For some time the State railways have been studying the possibilities of air conditioning railway coaches.

Private railways have also been contemplating the installation of equipment, and it is reported that a group of lines in East Java has built an air-conditioned coach which has been loaned to the State railways for demonstration purposes.

The excessive heat encountered in the Netherland Indies makes probable the development of a huge, new foreign market. Scientific and commercial circles in Java are awaiting the report of Prof. Dr. Mom's investigations, Mr. Smith said.

This Is the Valve Plate

All valves are in one plate in the head of the compressor.

Positive action, quietness of operation, and accessibility meet the strenuous demands of Mills Modernized Refrigeration.

Mills Condensing Units

MILLS NOVELTY COMPANY, 4100 FULLERTON AVENUE, CHICAGO, ILLINOIS

Air Conditioning Made Easy — By F. O. Jordan

Methods for Making Check Tests in the Field

SECTION NO. 16 (Cont.)

Test Data

Field Testing

Very often a certain amount of field testing is necessary for the purpose of checking the installation or for assistance in deciding upon the proper remedial measures to take in correcting an unsatisfactory installation. Obviously such tests must be of much rougher nature than the laboratory tests described above because of the usual lack of testing facilities in the field.

Field checks upon the capacity actually delivered in the field are as follows:

Air-Conditioning Units And Water Coolers

The sensible capacity of the air heating or cooling unit may be determined as follows:

Measure dry bulb temperature of air entering and leaving unit. Measure air flow through unit.

The air flow in cubic feet per minute is equal to the air velocity in feet per minute multiplied by the free cross-sectional area of the air passage through which the air velocity is measured.

The air velocity may be measured by means of the anemometer, velometer, or other air velocity indicator, or it may be computed from the velocity pressure as determined by means of a pitot tube and draft gauge, remembering that—

$V=4{,}000\sqrt{P}$, where

V=Approximate air velocity in feet per minute.

P=Velocity pressure in inches of water as read from pitot and draft gauge.

The results obtained from the use of the above formula are approximate only, but are sufficiently accurate for usual field use.

In many cases, none of the above air measuring apparatus is available, or the installation is such that its use is impracticable or impossible.

To use an anemometer or similar instrument, air supply or exhaust openings must be accessible, and duct extensions must be provided of sufficient length to remove the instrument from the influence of grilles, registers, filters, and other obstructions if any degree of accuracy is desired. Furthermore, if the anemometer is used at an exhaust opening instead of a supply opening, a different correction factor must be applied.

For these reasons, the most generally satisfactory way to check upon air flow or volume is to consult the manufacturer's performance chart or table for the air circulating fan. In this way check can be made according to the fan speed, the power required to operate the fan, and the total air static against which the fan is operating.

The fan speed may be taken by means of a tachometer or speed counter, or by proportioning the fan speed to the motor speed as read from the motor name plate, remembering that—

$$\text{Fan R.p.m.} = \frac{\text{(Diam. Motor Pulley)} \times \text{(Motor R.p.m.)}}{\text{Diam. Fan Pulley}}$$

The power required to operate the fan may be determined by reading the motor wattage from a watt meter, and multiplying this wattage by the motor and transmission efficiency. Motor efficiencies may be obtained from the manufacturers, or may be assumed to be roughly 90%. Motor watts may be converted to fan horse power by remembering that—

$$\text{Fan Hp.} = \frac{\text{(Motor Watts)} \times \text{(Motor \& Trans. Eff.)}}{746}$$

Air static may be read from a draft gauge which is provided with flexible hose and a draft tube which may be inserted into the duct where the static pressure is to be measured.

The total static upon the fan is equal to the arithmetical sum of the discharge static plus the suction static. For example, if the discharge static is +0.2 inches of water, and the suction static is —0.1 inches of water the total static is 0.3 inches of water.

The usual fan performance table shows the air delivery which will be obtained against various total air static or resistance pressures, at various fan speeds and power consumptions. Therefore, having ascertained the resistance pressure, the fan speed, and the fan power, the air delivery may be estimated from the fan performance table with a fair degree of accuracy.

Having determined the air flow or volume passing through the unit, and the dry bulb temperature change of the air occurring during this passage, the sensible capacity may be read from Fig. 79, or may be estimated from the following equations:

For cooling service:

HS=1.04×c.f.m.×TD.

For heating service:

HS=1.07×c.f.m.×TD.

HS=Sensible capacity.

C.f.m.=Cubic feet per minute of air delivery.

TD=Dry bulb temperature change of air in passing through unit.

The total capacity of the air-conditioning unit may be estimated by any of the following methods:

1. Determine the total work performed per pound of air circulated through the unit (as determined by one of the methods described above).

First subtract the total heat per pound of air at the leaving wet bulb temperature from the total heat per pound of air at the entering wet bulb temperature. (The total heat per pound of air at given wet bulb air temperatures is given in Table 8.

Then multiply the total heat removed per pound of air by the number of pounds of air circulated per hour through the unit. The pounds of air per hour corresponding to cubic feet per minute are given by Fig. 79.

2. For the direct expansion air-conditioning unit, determine developed total capacity by noting the suction pressure, head pressure, and revolutions per minute of the condensing unit, and determining the resultant capacity from the performance table or chart for the condensing unit.

3. For the chilled water air-conditioning unit of the water cooler, determine the total capacity by multiplying the degrees of water temperature rise or fall by the pounds of water circulated per hour.

The pounds per hour of water equals gallons per minute multiplied by 500. The gallons per minute of water flow may be read from the performance chart or table for the circulating pump, provided that the total water friction head against the pump, the revolutions per minute of the pump, and the power required by the pump are known.

These factors may be ascertained in the manner described for obtaining data to be used in determining the air delivery of fans, except that pressure gauges are used (for determining the water friction head against the pump) instead of the draft gauge and tube (which is used for determining the air friction against the fan). The water friction head against the pump is the difference between the discharge and suction pressures at the pump.

Condensing unit capacities may be determined in the field most easily by noting the suction pressure, head pressure, and the revolutions per minute, and by reading the corresponding capacity from the performance chart or table for the unit.

The capacity of the water cooled condensing unit may be approximated by multiplying the pounds of condensing water circulated per hour, by 85% to 90% of the temperature rise of the water. This equation is:

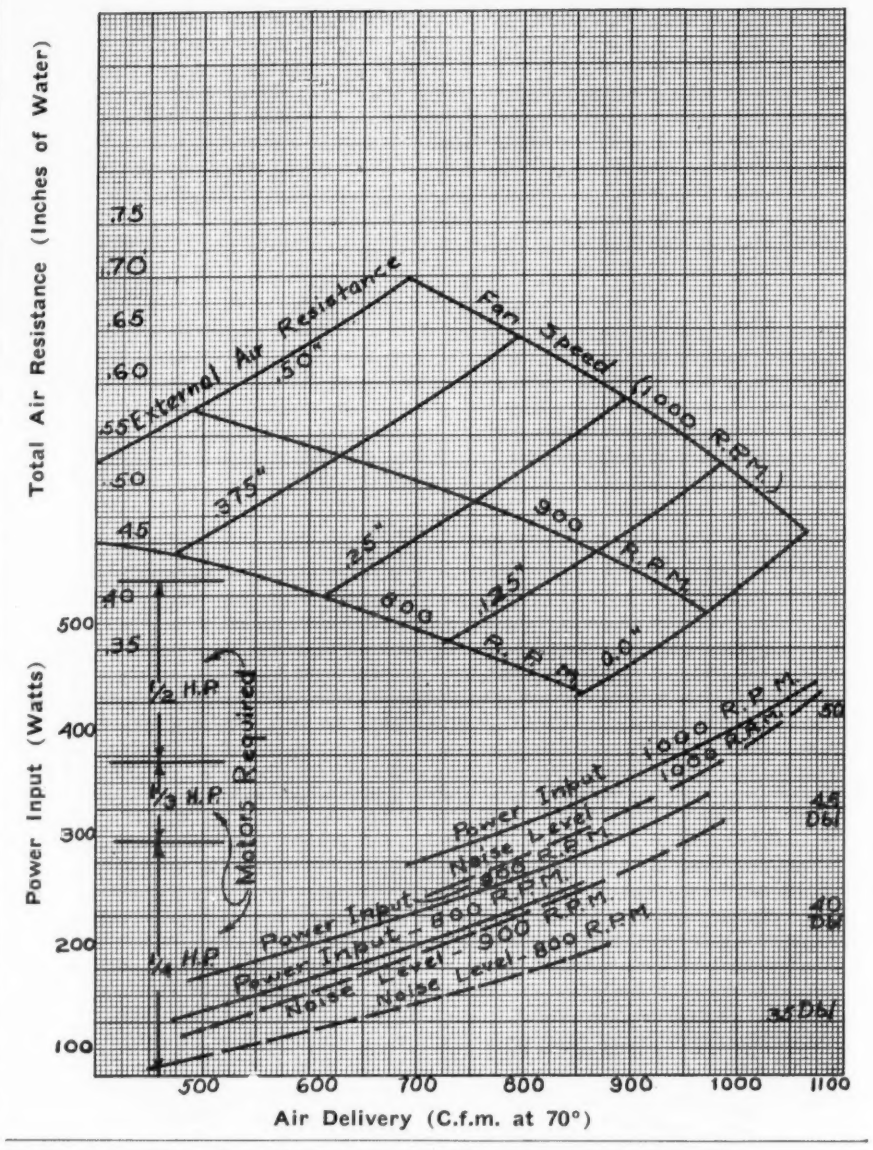
Capacity=W×0.85 TR.

Capacity=Approximate capacity in B.t.u. per hour.

W=Condensing water rate in pounds per hour.

TR=Temperature rise of condensing water.

Fig. 96—Air Delivery, Noise Level, And Power Consumption



Problems in Testing

As a problem in testing, take for an example a year-around air-conditioning unit which includes air circulation and cleaning at all times, cooling and dehumidifying in summer and heating and humidifying in winter. Assuming further that the development of the unit is complete so that its performance and its features are satisfactory, the following information must be obtained to assist in the design of future equipment, and so that ample data tables or curves may be developed for field use.

1. Air delivery, power consumption, noise level at various fan speeds and at various external resistances due to the air friction through air distributing system, resistance to airflow of the various elements of the unit at various air deliveries within the useful range of the unit.

This data should be within the useful range of the unit and should

(Continued on Page 17, Column 1)

DEPEND ON GENERALS

TIGHT CLOSING
POSITIVE OPENING
SOLENOID VALVE

★ Illustrated is the GENERAL K-15 Magnetic Valve specifically designed for the control of refrigerants. Tight closing with the line pressure on top of the seat . . . current failure . . . fully ported to handle large capacities at a minimum pressure drop . . . fully powered to provide instant opening . . . quiet in operation.

GENERAL CONTROLS
1505 Broadway, Cleveland, Ohio • 1370 Harrison St., San Francisco, Calif.
267 5th Ave., New York City, N.Y. • 421 Dwight Building, Kansas City, Mo.

CURTIS OFFERS A COMPLETE LINE of CLEANABLE SHELL and COPPER TUBE TYPE CONDENSING UNITS

THE complete Curtis line of 86 condensing units includes not one, but 7 models with shell and tube condensers, ranging from 3 to 30 H. P. All Curtis shell and tube condensers have removable heads for cleaning, automatic water valves and spring loaded safety valves. All compressors are equipped with Timken-tapered roller main bearings and Curtis' patented "Centro-Ring Pressure" lubrication, with no wearing parts, providing positive, trouble-free oiling.

There is a Curtis unit for every air conditioning and refrigeration need — from 1-6 to 30 H. P. Eighty-three years of manufacturing experience and a million-dollar corporation stands behind every Curtis product.

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Canadian Curtis Refrigeration Co., Ltd.
20 George St., Hamilton, Ontario

CURTIS
CURTIS REFRIGERATING MACHINE CO.
Division of Curtis Manufacturing Co.
1912 KIENLEN AVE. ST. LOUIS, MO.

How to Proceed in Making Tests of Air-Conditioning Equipment

(*Continued from Page 16, Column 5*)

be obtained under heating service, and again under cooling service.

2. Cooling and dehumidifying capacities and refrigerant pressure drops at various air deliveries, entering air conditions and refrigerant temperatures.

3. Heating and humidifying capacities at various air deliveries, entering air conditions, and steam pressures or water temperatures. Also, the effect upon humidifying capacity of water pressure if the humidifier is of the water spray type.

To obtain the data mentioned under item No. 1, the air conditioning unit may be properly connected to one of the wind tunnels previously described and tests run at a range of external statics and fan speeds, and the air delivery, power consumption, noise level, and pressure drop through various elements noted at each external static and fan speed.

From this data, the curves shown by Fig. 96 may be plotted. In the case of an air-conditioning unit which is provided with a by-pass damper, such curves should be plotted for the unit with the damper open as well as closed, and in some cases for intermediate positions also.

If the unit under test is to be used for heating service, the above tests should be run with no refrigerant in the cooling coil so that the coil is dry, and the tests should be run at 70° standard air (or the results reduced to 70° standard), since entering air is approximately at this condition during heating service.

If the unit is to be used for cooling service also, the above tests should be repeated and the data replotted with the coils refrigerating, and with entering air at 80° dry bulb temperature and 50% relative humidity (or the results should be reduced to that standard), since the presence of the moisture of dehumidification upon the coil surface has considerable effect upon the resistance to airflow through the coil, and since the usual entering air condition during cooling service is approximately 80° dry bulb and 50% relative humidity.

Since it generally is difficult to maintain fan speeds, external statics, or entering air conditions, at exact values, the work of testing may be greatly facilitated by holding test conditions as close as practicable to those desired, and correcting to standard by utilizing the following relationships:

Air delivery varies directly as fan r.p.m.

Air pressure varies directly as the square of fan r.p.m.

Fan power varies directly as the cube of fan r.p.m.

Air pressure varies directly as the ratio of the weight of the air per pound at the standard condition to the weight at the test condition.

The weight of air at various air conditions and barometric pressures may be read from Fig. 79.

Air deliveries in cubic feet per minute are determined by multiplying the air velocity through the high velocity duct (for the pitot tunnel) or through the orifice (for the orifice tunnel) by the cross-sectional area of the duct or orifice respectively.

Air deliveries in pounds per hour are determined by multiplying the air delivery in cubic feet per minute by 60 times the weight per cu. ft. of air.

To obtain the data mentioned under item No. 2, the air-conditioning unit may be properly connected to one of the wind tunnels previously described, and tests run at a range of air deliveries, entering air conditions, and refrigerant temperatures (or water temperatures and velocities) as necessary to develop the charts shown by Figs. 89 to 91, by the method described under the heading "Test Data."

Capacities are determined as follows:

A. *TOTAL CAPACITY:* Determine the air delivery in pounds per hour as described above. Ascertain the total heat in B.t.u./lbs. of air at the entering wet bulb temperature, and at the final wet bulb temperature. (See column 2, Table 8), and compute the total heat removed per pound of air by subtracting the heat per pound at the final condition from the heat per pound at the entering condition. Compute the total capacity of the unit by multiplying the air delivery in pounds per hour by the total heat removed per pound.

B. *SENSIBLE CAPACITY:* The sensible capacity is determined in the same way, except that sensible heats per pound of air are used instead of total heats (see column 3, Table 8).

C. *LATENT CAPACITY:* Latent capacity is the difference between total and sensible capacities.

Refrigerant pressure drops may be determined at various total loads and suction pressures, and plotted as shown by Fig. 97.

The heating capacities mentioned under item No. 3 above, are determined by properly connecting the unit to the wind tunnel and noting the heating capacity at a suitable range of velocities. In the case of steam heating, the capacity with entering air at an easily available temperature and with steam at 5 lbs. pressure

(*Concluded on Page 18, Column 3*)

Table 8—Properties of Air

Explanation of Table 8

Column No. 1 shows air temperature, either dry bulb, wet bulb, or dewpoint, as the case may be.

Column No. 2: Read the Total Heat per Lb. of air from this column opposite the *wet* bulb temperature in column No. 1.

Column No. 3: Read the Sensible Heat per Lb. of air from this column opposite the *dry* bulb temperature in Column No. 1.

Column No. 4: Read the Latent Heat per Lb. of *saturated* air from this column opposite the *dry* bulb temperature in column No. 1. To determine the Latent Heat of a pound of air which is *not* saturated, multiply the Latent Heat at saturation (determined as described above) by the per cent of relative humidity.

The Relative Humidity of a sample of air is determined from these tables as follows:

A. Read the Total Heat per Lb. of the sample from column No. 2 opposite the Wet Bulb Temperature in column No. 1.

B. Read the Sensible Heat per Lb. of the sample from column No. 3 opposite the Dry Bulb Temperature in column No. 1.

C. Determine the Latent Heat of the sample by deducting the Sensible Heat from the Total Heat.

D. Determine the Relative Humidity of the sample by dividing the Latent Heat of the sample by the Latent Heat at saturation as read from column No. 4 opposite the Dry Bulb Temperature of the sample in column No. 1.

Column No. 5: Read the Cu. Ft. per Lb. of saturated air from this column opposite the dry bulb temperature in column No. 1.

Column No. 6: Read the Cu. Ft. per Lb. of dry air from this column opposite the dry bulb temperature in column No. 1.

Determine the Cu. Ft. per Lb. of a sample of air, which is not saturated by multiplying the difference between the values in column No. 5 and column No. 6 (opposite the Dry Bulb Temperature of the sample in column No. 1) by the per cent of Relative Humidity of the sample and adding the result to the value in column No. 5.

Column No. 7: Read the pounds of water vapor required to saturate a pound of dry air from this column opposite the dry bulb temperature in column No. 1.

Column No. 8: Read the grains of water vapor required to saturate a pound of dry air from this column opposite the dry bulb temperature in column No. 1.

Read the pounds or the grains of water vapor in a given sample of air which is not saturated, by multiplying the weight of water vapor required to saturate the sample (as read from column 7 or column No. 8 as described above) by the per cent of Relative Humidity of the sample.

Determine the Dewpoint Temperature of a sample by locating the weight of water vapor per pound of the sample in column No. 7, or in column No. 8, and reading the temperature opposite this volume in column No. 1.

Table 8—Properties of Air (Continued)

Temp. Deg. F.	Heat Content Above 32° F. —B.t.u. per Lb. of Dry Air— Total Heat At WB Temp.	Sensible Heat At DB Temp.	Latent Heat at Satura.	Cubic Feet Per Lb. Saturated Air	Cubic Feet Per Lb. Dry Air	Vapor to Saturate Pounds Per Lb. Dry Air	Vapor to Saturate Grains Per Lb. Dry Air
1	2	3	4	5	6	7	8
32	4.06	0.00	4.06	12.47	12.39	.003782	26.50
35	5.31	0.72	4.59	12.55	12.47	.004268	29.88
40	7.52	1.92	5.60	12.70	12.59	.005202	36.41
45	9.94	3.12	6.82	12.85	12.72	.00632	44.21
50	12.58	4.32	8.26	13.00	12.84	.00764	53.47
55	15.49	5.52	9.97	13.16	12.97	.00920	64.43
60	18.72	6.72	12.00	13.33	13.10	.01105	77.2
65	22.32	7.92	14.40	13.50	13.22	.01323	92.6
70	26.33	9.12	17.21	13.69	13.35	.01578	110.5
75	30.83	10.32	20.51	13.88	13.48	.01877	131.4
80	35.90	11.52	24.38	14.09	13.60	.02226	155.8
85	41.62	12.72	28.90	14.31	13.73	.02634	184.4
90	48.12	13.92	34.20	14.55	13.86	.03109	217.6
95	55.49	15.12	40.37	14.80	13.98	.03662	256.3
100	63.88	16.32	47.56	15.08	14.11	.04305	301.3
105	73.42	17.52	55.90	15.39	14.24	.0505	354
110	84.50	18.72	65.78	15.73	14.36	.0593	415

Movie Studios Good Field For Cooling, Hertzler Finds

HOLLYWOOD, Calif. — John R. Hertzler, manager of the air-conditioning department of York Ice Machinery Corp., recently flew here to make a survey of air-conditioning possibilities for motion picture sets.

After visiting several major studios, Mr. Hertzler reported that actors greatly favor comfort cooling.

"Working under Klieg lights is extremely uncomfortable," he declared, "and the heat generated by them necessitates use of considerable grease paint to keep perspiration from showing on the actors' faces. Air conditioning would eliminate much disagreeable make-up."

Loeffler-Greene Handles Mercoid Controls

OKLAHOMA CITY — Loeffler-Greene Supply Co. has been appointed a distributor for the line of controls manufactured by Mercoid Corp., Chicago, specializing in automatic controls for the petroleum industry.

New Straits Settlement Hospital To Have Conditioned Wards

SINGAPORE, Straits Settlements —At Ipeh, a new hospital with accommodation for 1,000 patients has been approved by the governor. An innovation will be air conditioning in the upper class wards, reports Trade Commissioner Harold D. Robison.

THE BUYER'S GUIDE

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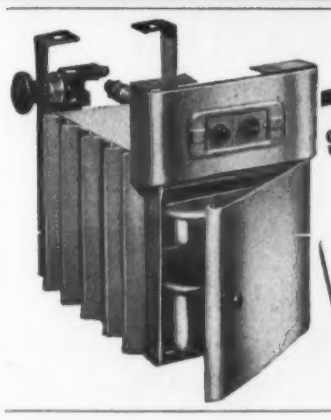

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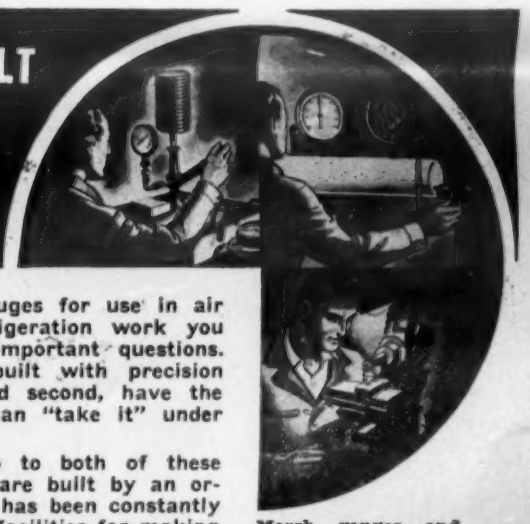

WHEN you purchase gauges for use in air conditioning and refrigeration work you should ask yourself two important questions. First, are these gauges built with precision manufacturing methods and second, have the gauges proved that they can "take it" under service conditions?

Marsh gauges measure up to both of these important standards. They are built by an organization that, since 1865, has been constantly improving the methods and facilities for making gauges to the highest standards of accuracy. The service records of the thousands of Marsh gauges in use today, stand as an eloquent testimonial to the fact that only time can test a gauge.

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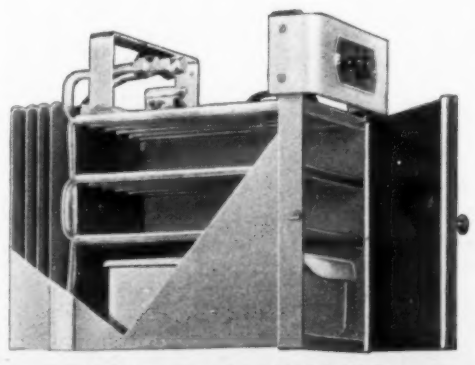

Cut Away View—Model A2V

"Humidi-Pack" is that good looking evaporator with the bright, clean finish—the one that maintains high box humidity with down draft circulation and preserves food better—that freezes ice cubes faster —that eases the compressor load.

"Humidi-Pack" is the evaporator that everyone wants and is entitled to have. There's more performance per dollar in "Humidi-Pack"—but it costs no more than other units.

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JOBBERS IN ALL PRINCIPAL CITIES

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5 Theaters in West Penn Area Add Cooling Equipment

PITTSBURGH—Aiming at increasing box office receipts, five more theaters in this territory covered by the West Penn Power Co. have recently installed a total of 255 tons of air conditioning.

Among the installations are two Warner Bros. theaters, the Manos in Greensburg, and the State theater in Washington. Each of these is equipped with a 70-ton Frigidaire system.

A 50-ton Carrier system has been installed in the Coyle theater in Charleroi. Two small theaters in Irwin, the Lamp, which seats 469, and the Aladdin, with a seating capacity of 685, have been equipped with 25 and 40-ton systems.

4-Story Agfa-Ansco Building To Have All-Year System

BINGHAMTON, N. Y.—Plans for the new four-story building to be constructed by Agfa Ansco Corp. to house administrative offices and research laboratories call for complete air conditioning and extensive insulation.

The building will have concealed air-supply ducts with with outlet ports in the window sills to prevent drafts in the rooms and to minimize sweating of windows in cold weather.

Insulation of the building will be achieved by use of a layer of cork in the roof and by 12-inch walls composed of 4 inches of tile separated by an air space from 8 inches of brick.

Determining Heating Capacities in an Air-Conditioning System

(*Concluded from Page 17, Column 3*)

may be plotted versus air delivery and the heating capacity for other entering air conditions and steam pressures may be computed from this basic curve by means of factors taken from Table 9.

Hot water heating capacities should be determined over the useful range of entering air temperatures, initial water temperatures, water temperature drops, and water velocities through the coil.

Generally the following ranges will suffice:

Initial water temperatures 180°-220°
Water temperature drops.. 20°- 30°
Entering air temperature.. 50°- 70°
Water velocities .....150°-250° f.p.m.

Heating capacities may be determined by multiplying the air delivery in pounds of air per hour, by the temperature rise of the air, by the specific heat per pound of air or .24.

Steam heating capacities may be determined also by multiplying the condensate (as weighed) by the difference between the heat per pound of steam at the entering pressure and the heat per pound of condensate at the leaving temperature (see Table 10).

Humidifying capacities may be determined by multiplying the air delivery in pounds per hour by the difference between the moisture per pound of air at the entering air condition, and the moisture per pound of the air at the final air condition (see Table 8).

Table 9—Constants for Obtaining Temperature Rise at Various Steam Pressures and Entering Air Temperatures

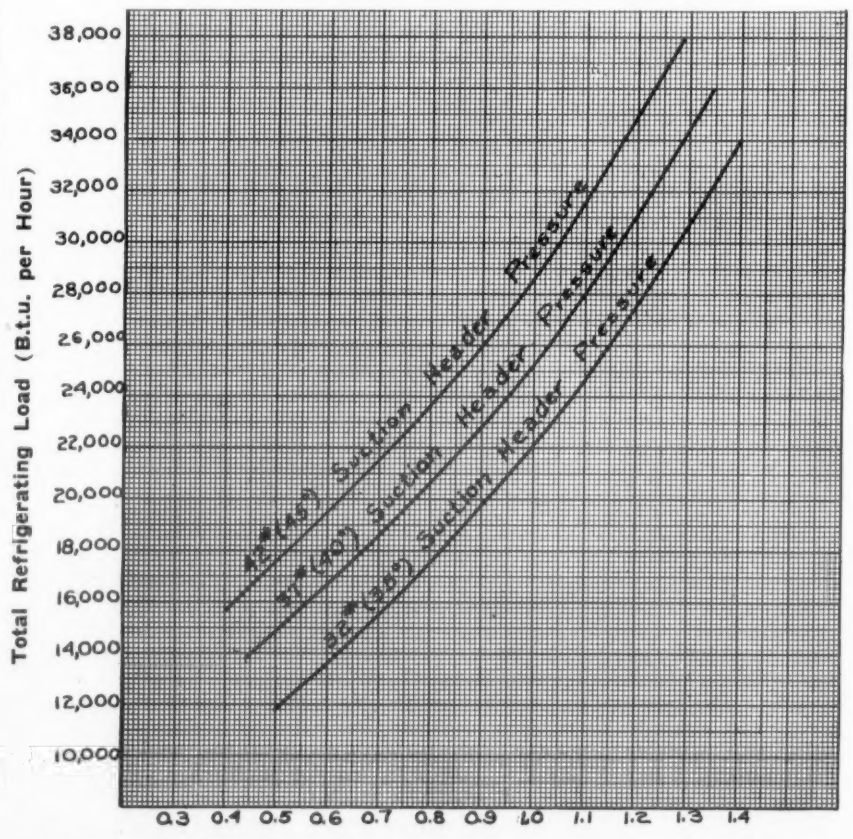
Note: To obtain Temperature Rise for Steam Pressures or Entering Air Temperatures other than those shown in Table, multiply the ratings for ZERO Entering Air Temperature and 5 POUNDS Steam Pressure as shown in the various Tables, by Conversion Factors given in this Table.

Enter. Air Temp. °F.	Steam Pressure in Pounds Per Square Inch (Gauge) 0	2	5	10	15	20	30
—10	.977	1.006	1.044	1.098	1.143	1.183	1.250
0	.933	.962	1.000	1.054	1.100	1.139	1.206
10	.889	.918	.956	1.010	1.055	1.095	1.163
20	.845	.874	.912	.966	1.012	1.051	1.119
30	.801	.830	.868	.922	.968	1.007	1.075
40	.757	.786	.824	.877	.923	.963	1.030
50	.713	.742	.780	.834	.879	.919	.986
60	.669	.698	.736	.790	.835	.875	.943

Table 10—Properties of Saturated Steam

Vacuum In Inches of Mercury Pg	Pressure Absolute lbs. per sq. in. Pa	Temperature or Boiling Point °F.	Total Heat B.t.u. Above 32° In Liquid Sensible "h"	In Vapor Total H	Latent Heat of Vaporization L L=H—h	Volume 1 Lb. Vapor In Cubic Feet	Weight of 1 Cu. Ft. Vapor In Lbs.	Entropy of Liquid	Entropy of Evaporation
19.74	5	162.25	130.10	1130.6	1000.4	73.63	.01358	.2348	1.6088
9.56	10	193.21	161.13	1143.0	981.8	38.46	.02599	.2834	1.5040
0.3	15	213.03	181.04	1150.6	969.6	26.32	.03790	.3134	1.4414
5.3	20	227.96	196.09	1156.0	959.9	20.10	.0498	.3356	1.3960
10.3	25	240.07	208.33	1160.2	951.9	16.31	.0613	.3533	1.3604
15.3	30	250.34	218.73	1163.7	945.0	13.75	.0728	.3680	1.3310
20.3	35	259.28	227.82	1166.7	938.9	11.90	.0841	.3807	1.3060
25.3	40	267.24	235.93	1169.2	933.3	10.50	.095	.3919	1.2840
35.3	50	281.01	249.98	1173.5	923.5	8.517	.1173	.4111	1.2469
45.3	60	292.71	261.98	1177.0	915.0	7.172	.1394	.4271	1.2162

Fig. 97—Refrigerant Pressure Drop Chart



Kohlman Reports Big Week In Comfort Cooling Sales

CHICAGO—Sale of 57½ tons of air-conditioning equipment during the first week of June is reported by L. C. Kohlman, Inc., Frigidaire and Delco-Frigidaire dealer here.

Jobs sold for immediate installation include a 30-ton system in Solick's Bier Stube tavern, 4206 W. Madison; a 7½-ton system in the Red Dragon cocktail lounge, 205 W. Randolph; and a 20-ton system in the Allerton hotel, 707 N. Michigan.

Sales of Frigidaire portable room coolers so far this year have been far ahead of initial estimates, reports L. C. Kohlman, president.

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THE BUYER'S GUIDE

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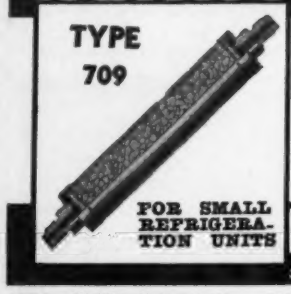
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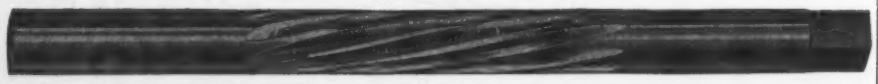
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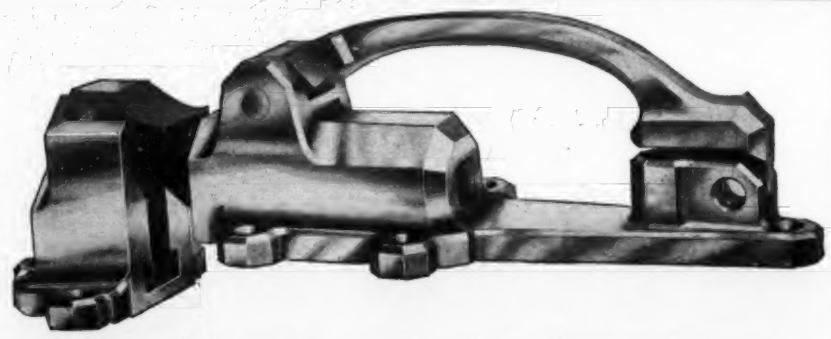
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How to Select and Install Air Conditioning Systems

By T. H. Mabley

CASE NO. 23
Combination Water & Direct-Expansion Job

This case illustrates a combination of water and direct-expansion cooling as applied to the top sales floor of a department store—the same department store that was under consideration in Case No. 22.

The space to be conditioned is not on the top floor of the building, but directly below the top floor. The latter is used for stock space and a survey indicates that this floor may be used also as the location for the air-conditioning equipment. The building is exposed only at the front and the rear. The space above the conditioned area is stock space, and below it is an air-conditioned floor.

The proposed system will have to perform all the commonly accepted functions of a complete air-conditioning system. For this purpose it appears that a central conditioning system will be employed. Some means must be provided for heating the air using steam from the main supply risers already installed.

The air must be cooled in the summer and at the same time a certain degree of dehumidification provided. The air circulated will be filtered and humidified as required during the winter.

Air distribution in this case will be from the center as shown for the first floor, but here must be installed the main supply trunk on the ceiling of the space above. The ceiling of the conditioned area is irregular and cut up with crosswise beams. Thus the arrangement with the ducts on the stock room ceiling will give a better appearance and eliminate costly furring work.

The discharge openings will be equipped with an especially designed grille outlet of the rectangular design. Air will be deflected four ways from the sides of the outlet in such a manner as to assure proper air distribution for the conditioned space.

A larger proportion of the air will pass through the two grilled sides of the outlet that face the walls of the space than will be discharged longitudinally. The regulation of the air flow may be controlled in this manner by either cutting down the discharge velocity from certain sides of the square outlet or by designing the outlet in a rectangular shape and thus proportioning the grilled area on each side to the required air flow.

These outlets will be connected to the main supply duct by means of branch risers from the duct on the ceiling of the top floor. The risers may in this case drop to the floor between two rows of cases and thus not obstruct any aisle space in the storage room.

All the ductwork in the storage space should be covered with at least ½ inch of insulation to eliminate possible condensation and excessive heat transmission.

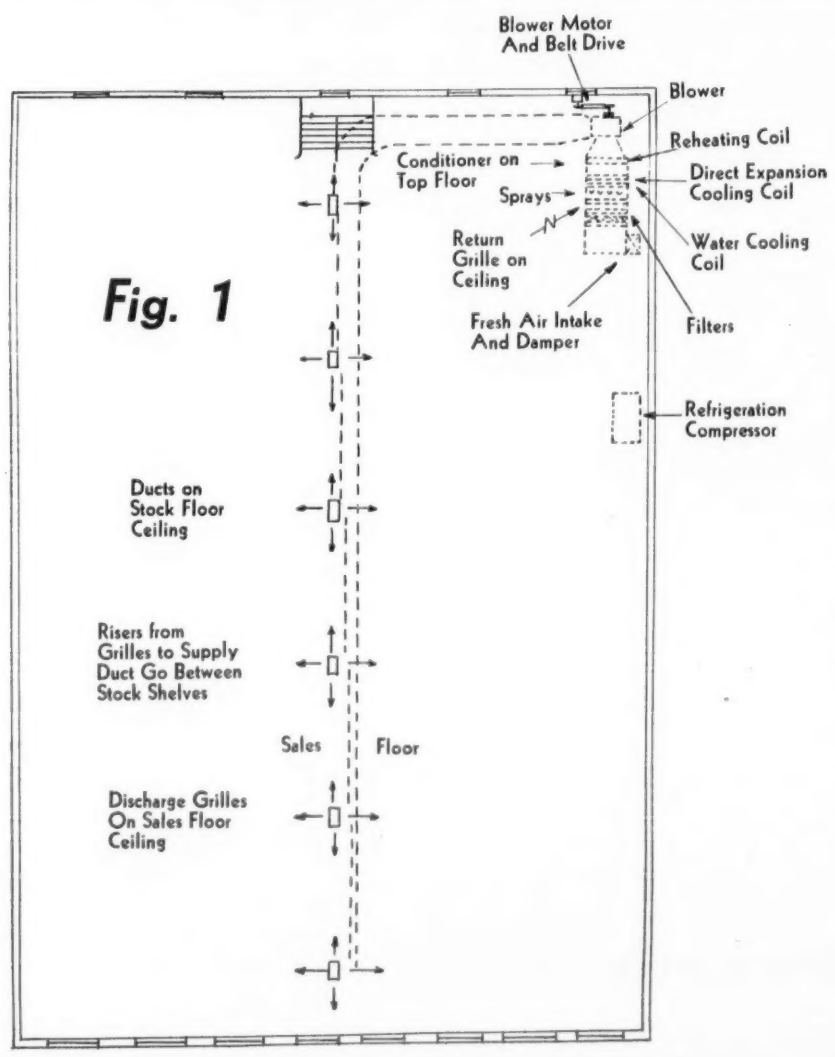


Fig. 1

The central conditioning equipment may be selected on the basis of the performance requirements. In this case we will have a cooling load of 27.8 tons and a heating load of approximately 170,000 B.t.u.

The cooling load will in general determine the volume of air to be handled, so for this problem the total air will be approximately 10,800 c.f.m.

The fan to handle this quantity of air must be selected from the manufacturers' catalogs. For preliminary calculations we may use a total resistance for the system of 1½ inches of water and so pick a single inlet single width fan that will handle 10,800 c.f.m. against this static pressure head and still not have an outlet velocity exceeding 2,000 c.f.m.

After the fan has been selected we can size the blower motor and belt drive, taking the required horsepower and fan speed from the fan manufacturer's fan data tables.

Next step will be the selection of the heating coils. From data provided by the various suppliers of this equipment we can choose a certain size copper fin type steam heating coil that will have sufficient capacity to offset the conduction heat loss of the conditioned space. The heat loss due to infiltration or minimum fresh air requirements will be handled by the tempering coil. This will mean that a coil will be required to raise the total mixed air from a minimum of 45° to a leaving temperature of not more than 72°.

In this case a single row coil having a total face area of 15 sq. ft. when supplied with steam at 5 lbs. pressure will serve this purpose.

The reheat coil will have to be of approximately the same size, as the most effective face velocities for this type of heating surface appear to range from 500 to 700 f.p.m.

For summer cooling we will use a combination of water cooling and direct-expansion refrigeration. This is possible because in this particular locality the city water supply comes from wells and the water temperature at the meter inlet to the building never exceeds 57°.

Since a certain quantity of water must be used by the refrigeration condenser we can first use this water by passing it through water-cooling coils in the conditioning unit and thence into the condenser. If the temperature were raised say 10° before the water went into the condenser the output of the condenser would be very slightly effected when the water being handled is at such a low range of temperatures.

If we were to use about 30 gallons per minute in the condensing unit and by means of a water coil in the air conditioner take enough heat out of the air to raise this temperature to 63° we would have the equivalent of approximately 7.5 tons of refrigeration. This would leave about 20.3 tons of cooling effect to be performed by the direct-expansion system.

In checking rating sheets we find that a standard 20-hp. condensing unit will give this output at about 38° suction temperature. The water-cooled condenser will require 31 gallons per minute maximum of 65° water to give this performance; thus our preliminary figures for water flow are approximately correct.

We can now proceed with the selection of the water coil and the direct-expansion cooling coil. In arranging the headers and water flow for the water coil care must be taken not to allow the total water pressure drop to exceed 5 lbs. as we must have enough head pressure available in the water lines entering the condenser to assure proper flow through the water regulating valve and the unit itself.

The process of precooling with water will reduce the temperature of the mixed inlet air from 82° to 74° dry bulb. Very little dehumidification will be performed by the water coil.

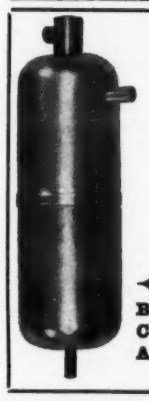
For design purposes we will neglect the latent heat load reduction by this coil and design our direct-expansion coil to handle the entire latent load and the balance of the sensible heat load.

The air entering the direct-expansion coil will be approximately 74° dry bulb. We will find that the low ratio of sensible heat load to total heat load will require that the direct-expansion coil be designed with a fairly low velocity, about 300 f.p.m., and the minimum possible refrigerant temperature.

Final step is to build the conditioner housing to include all the coils, some filters to be selected, and a humidifier spray header. Automatically controlled fresh air and recirculated air damper will be installed. These will be thermostatically controlled so that as the outside temperature approaches the desired inside temperature the proportion of fresh air will be increased.

A standard control system will be applied to the heating and cooling equipment and the water flow through the water-cooling coil in this case will be regulated by means of the water regulating valve operated by the refrigeration compressor head pressure.

This type of a system will only serve the proper function of economical operation under certain circumstances. First the water supply temperature must be exceptionally low, and second, the ratio of sensible to total heat cannot be very low as might be for the case of theaters or other crowded buildings having a low proportion of conduction loss.



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55 Engineers 'Graduate' From Carrier Course

NEWARK—Fifty-five young engineers, members of this year's third graduating class of Carrier Corp.'s 10-week training course in air conditioning, refrigeration, and unit heating, are now being assigned by Carrier Corp. to positions within the Carrier organization or with Carrier dealers throughout the world.

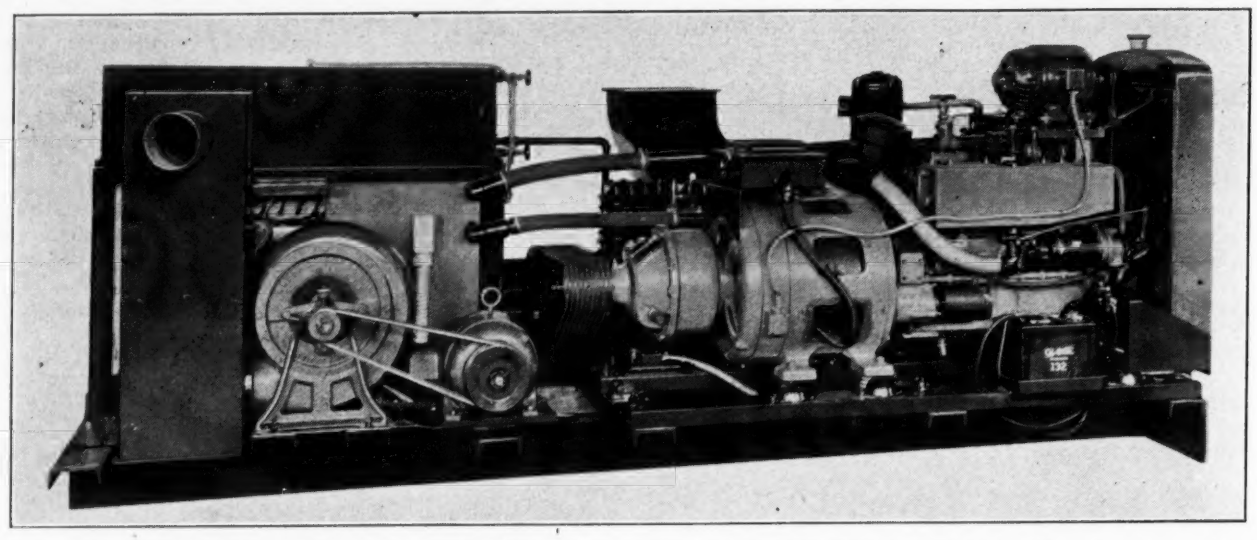
The training consisted of class work combined with inspections of factory operations and of prominent Carrier installations in this vicinity. Personnel of the course was selected by dealers or by personal interview. Many of the men were graduates of the country's leading technical schools.

Building Now Will Save Cost of Conditioning, Henderson Says

WASHINGTON, D. C.—Due to constantly rising building costs, people who build homes this year instead of waiting until 1938 will save enough money to finance installation of complete year-around air conditioning, predicts William B. Henderson, executive vice president of Air Conditioning Manufacturers' Association.

"Re-figuring of contractors' prices on a house built in a large Great Lakes city in May, 1936, at a cost of $19,175.13, shows it would require $22,519.12 to duplicate that house today," Mr. Henderson declared. "This situation extends throughout the entire country," he asserted, "and prices will continue to rise."

Truck-Mounted Air Conditioner for American Airlines



Twelve of these self-contained air-conditioning units, manufactured by General Refrigeration Co., have been purchased by American Airlines for use in cooling and heating planes while they are standing in the airport.

* * *

12 Truck-Mounted Conditioners to Keep American Airlines Planes Comfortable While Grounded at Landing Fields

BELOIT, Wis.—To keep landed airplanes from becoming too hot in summer and too cold in winter for the comfort of passengers boarding them, American Airlines, Inc. has purchased 12 self-contained air-conditioning units, each mounted on a speed-truck chassis, for use on its principal landing fields throughout the country.

These units were built and sold by General Refrigeration Corp. here.

Though able to maintain satisfactory cabin temperatures while traveling, planes tend to become warm or cold during stops, depending on the weather, in the same way that a closed automobile does while parked in the open.

By use of the new truck-mounted conditioners, however, it is claimed that the temperature of a plane's cabin can be lowered in summer or raised in winter to 70° F. within a few minutes. And passengers boarding the plane several minutes before it takes off are said to experience perfect comfort.

Able to be driven anywhere a truck can go, each of these units carries a special 5-inch hose through which conditioned air is discharged into plane interiors.

SPECIAL HOSE CONNECTION

End of the hose has a special bayonet type connection which fits into the conditioned air inlet of the plane. This connection is furnished with a spring gasket to reduce leakage.

Conditioned air can be supplied at the rate of 1,200 c.f.m. it is claimed.

Each of these "traveling" conditioning units is completely self-contained, no external source of power being needed. Each has its own power supply consisting of a gas engine which drives a 15 kw. generator. Current is furnished by this generator to electric heating coils and to the electric motors which operate the refrigerating unit and conditioning assembly.

In emergencies, the self-contained power plant can, without operation of the air-conditioning machinery, provide electricity for the landing field's radio station or lighting system.

Immediate shift from cooling to heating can be made to fit changing weather conditions.

Circulation of air is similar for both heating and cooling operations except for the position of a damper, by means of which the air column is directed to pass through either the upper part of the conditioner where heating coils are located or through the lower part over the cooling coils.

For summer cooling, warm outside air is taken into the side of the truck through a grille, then passed through a removable air filter. This filter can be removed from the outside of the truck body.

AIR FILTERED, COOLED

From the filter the air is drawn over evaporator coils where it is cooled and dehumidified, through a silencer chamber, and into the centrifugal blower. It is then discharged into an air silencer, goes through an adjustable elbow located in the side of the truck body, and is delivered to the plane via the hose.

The blower motor, operated by electricity generated by the engine, must be started as soon as the refrigerating machine is started. Otherwise the evaporators will freeze up, the compressor will operate at low suction pressure, and the low pressure cutout will stop the engine.

Located above the conditioning unit is a large water tank provided with a water sight glass, overflow connection, and water supply connection to the hydro-cyclonic condenser float valves, and to the supply valve at the rear of the unit.

The supply valve terminates in a female hose adapter which permits filling the water tank from any standard ¾-inch water hose.

WINTER HEATING USE

When the unit is used for winter heating, the two brass valves on the pipes from the gasoline engine to the water heating coil are opened, and the thermostatic valve in the radiator line is turned to winter position, causing the engine to run at a higher water jacket temperature.

Since operation of the refrigerating machine is not required for winter use, the clutch controlling it is thrown out.

The water heating coils, serving to pre-heat the cold outside air brought in, are supplemented by four aluminum grid-type electric heaters of 5-kwh. capacity which can be thrown in to the circuit one at a time as needed.

Each of the electric heaters is provided with an overload protection device which will cut out its supply of current if the fan is not operating.

The refrigeration system consists of a 3½-inch bore, 4-inch stroke, 4-cylinder, Freon-12 compressor which discharges gas into a model EC-70 hydro-cyclonic condenser.

Condensed refrigerant passes into a liquid receiver, liquid line strainer, magnetic valve, heat interchanger, expansion valve, and evaporator core, then returns to the suction valve of the compressor.

V-BELT DRIVEN

The compressor is driven by means of V-belts when the clutch of the gasoline engine is thrown in.

A pressure cutout switch shuts off the engine when discharge pressure of the system becomes too high or the suction pressure becomes too low.

Before shipment, the refrigeration system is completely charged with refrigerant and tested for leaks. All valves are left open and ready to operate. The receiver has sufficient capacity to take the complete refrigerant charge.

The gasoline engine is provided with a 6-volt battery, a starting motor, and an automatic governor that maintains speed at 1,200 r.p.m. Fuel is delivered to it through a copper tube extending from the regular gas tank of the truck. Openings in the bottom of the engine allow oil to be drained from the crankcase and water from the radiator.

ENGINE CONTROL PANEL

All controls for starting and stopping the gas engine are located in the control panel on the back of the assembly. Also on this panel are switches for operating the various fans and heating units. For night service, a small pilot light is run off the battery.

An automatic choke on the carburetor is controlled by a thermal element on the exhaust manifold. On the gas engine section of the control panel is an oil pressure gauge, jacket water temperature thermometer, and ammeter showing the battery charging rate.

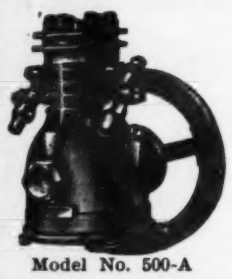
To reduce noise and the danger of backfire, a three-pass flame-retarding type of exhaust muffler is used.

Air for the gas engine and refrigerating machine enters one side of the truck, passes through the interior of the truck body, and is discharged from the radiator through an opening in the rear door.

When the refrigeration machine is in operation, additional air is discharged through the condenser and out an opening in the truck's top. The unit may be operated under normal conditions with both of the rear doors closed, it is claimed.

(Concluded on Page 21, Column 1)

THE BUYER'S GUIDE



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TWO NEW TUBE BENDERS that make tubing work easy to handle

AMONG the many Imperial service aids that speed up installation and service work are two new tube benders.

You will want to try out the new No. 364-F hand tube bender. It's a very inexpensive tool and yet with it you can make neat and accurate bends quickly and easily. Bending shoe slips over the tube and bends the tubing around the form.

Furnished in nine sizes to take 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8" and 3/4" tubing.

The new 460-F bender not only makes all types of bends but has the added advantage of forming round and obround coils—something *entirely new* in tube benders. Furnished in four sizes—3/8", 1/2", 5/8" and 3/4" tubing.

Call your jobber and try out one of these new tube benders.

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No. 460-F Tube Bender

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Greenville, Pa.
Over a sixth of a century in electric refrigeration

Airplane Conditioners Now Being Made on Production Basis

(*Concluded from Page 20, Column 5*)

A twin disc clutch is furnished for the gasoline engine-generator hookup. It is operated by a lever located at the rear of the unit between the electric panel board and the radiator.

When the clutch is thrown in, a cam arrangement at the bottom of the clutch operating the crank engages with a limit switch which automatically closes the circuit of both the electric control for the hydro-cyclonic condenser motor and the magnetic valve feeding refrigerant to the evaporators.

Driven from the shaft extension at the front of the motor, a d.c. exciter supplies current to the 220-volt, 3-phase, 60-cycle, a.c. generator. The generator is directly connected to the gas engine, and over it is mounted a main line switch with fuses.

This switch in normally left closed, current from it being delivered through the main cable to the buss bars in the control panel.

Truck bodies of these portable air-conditioning units are steamlined, ventilated, and made sound proof to reduce operation noise when in use near the landing field's station. To support the air hose, a suitable channel is built into the rear fenders and around the back.

The complete air-conditioning unit is mounted on a rigid angle-iron frame to facilitate installation of the assembly within the truck.

General Refrigeration Corp., which has been doing air conditioning development work with several air lines for some time, is now manufacturing these units on a regular production basis.

More than one type of these units is now available, selection depending on whether both cooling and heating operations are desired, the size of the planes, the speed at which they must be cooled, and other variable factors.

RSES Chapter Formed In Jackson, Miss.

JACKSON, Miss.—A local chapter of Refrigeration Service Engineers Society has been organized here with Joe T. Cross of Home Appliance Co. as president, and J. P. Binns and James Lawrence as secretary and treasurer.

W. Hall Moss of Memphis was present for the organization. A charter from the national organization will be sought. The group will extend an invitation for the next national R.S.E.S. convention.

Ben Boalt Joins Perfex As Vice President

MILWAUKEE—Ben L. Boalt, former director and vice president of Penn Electric Switch Co., has left that position to become a vice president of Perfex Controls Co., manufacturer of heating, refrigeration, and air-conditioning controls.

Mr. Boalt had been with Penn since 1931.

He entered the controls field in 1921 as secretary and director of Minneapolis Heat Regulator Co. He continued in these capacities when Minneapolis-Honeywell Regulator Co. was formed. When Time-O-Stat Controls Co. was acquired, he became manager of the Elkhart, Ind., plant.

FOR THE SERVICE MAN

Bay City Service Man Makes Specialty Of Servicing Cargo and Pleasure Boats; Gets Jobs by Ship-to-Shore Radio

BAY CITY, Mich. — Refrigeration service work on cargo and pleasure boats, frequently done while the boats are still pulling into port, is the specialty of Charles H. Earl, head of the Refrigeration Service Co. here.

A Kelvinator dealer, Mr. Earl sells and services domestic, commercial, air-conditioning and heating equipment, doing all his own installing and overhauling. He has been in refrigeration work for 15 years.

Bay City, located on Saginaw river not far inland from Saginaw bay, is an important Lake Huron port.

"We have a great number of boats coming in here constantly from a great many ports all over the world and 90% of them have mechanical refrigeration," Mr. Earl explained. "We have been called upon to service many of the boats.

"The majority of boats run on schedule and they have to have service immediately so that their schedules are not interrupted. We have our own power boat docked at the mouth of the river for marine service when required."

Ship captains inform owners via ship-to-shore radio when their boats require refrigeration service, and the owners then notify Mr. Earl of their requirements and tell him when the boats will arrive in the bay or at the mouth of the Saginaw river.

"A ship's refrigerator equipment usually consists of a walk-in cooler, in which is stored vegetables, meats, and other foodstuffs needed for trips," explained Mr. Earl. "Some private yachts have private bars equipped to make ice cubes, etc. for mixed drinks, and they also have a butler's box, in which prepared foods are kept."

It is very hot in the engine rooms of the boats, where the compressors are installed, Mr. Earl declared. His thermometer has registered as high as 125°, he said.

"Sometimes the boats come into the bay late in the afternoon, and it takes anywhere from two and a half to sometimes as much as five hours to go down the river, due to the many twists and turns, and also depending upon the length of the boat," Mr. Earl stated.

"So we found that if we could board the boats out in Saginaw bay, we could often get off at Winona dock in Bay City with our job completed, or, if we had a great amount of work to do, we would ride the boat into Saginaw, about 10 miles up the river, and usually by the time we arrived there we would have the job finished, and the service truck would pick up the service men and bring them back."

Mr. Earl employs four men in cars who, with Mr. Earl, comprise the service department.

Besides refrigeration service, Mr. Earl frequently provides another type of service—to becalmed sailboats and small yachts broken down with engine trouble, by towing them into port.

That there are hazards in his business was affirmed by Mr. Earl. His service boat was "swamped" last fall and he lost a considerable amount of equipment, including his rubber boots and coveralls while swimming to safety.

Chuckling as he recalled another incident, Mr. Earl went on to say:

"A boat works here called us once to service some refrigeration on a yacht being made ready for a trip to Bermuda. At that particular time we were quite busy and had no service men available, but they told us that it would require about an hour's time, and that they would appreciate it very much if we could help them out, which we finally agreed to do.

"We boarded the yacht at the boat works and started working on the equipment. They were running the motors at that time, charging batteries, and it was so noisy in the hold of the boat that you could not hear one another without shouting.

"We finished our work on the machine and had everything functioning 100%, but when we went up on deck, to our surprise, we found that we were out in Saginaw bay headed for the Charity islands, which is approximately a six-hour trip. They had forgotten all about our being on board!"

What happened then Mr. Earl didn't say.

Texaco Booklet Outlines Lubrication Factors

NEW YORK CITY—Factors determining the correct lubricants for various compressor units employed in refrigeration and air conditioning are discussed in "Selection of Lubricants in Mechanical Refrigeration," a 55-page booklet recently published by The Texas Co., producer of Texaco petroleum products.

Among the many factors affecting the selection of the proper oil for any particular compressor unit, the booklet says, are:

1. Qualities of different refrigerants —especially their purity, susceptibility to absorption by oil or water, and range of working temperatures.
2. Characteristics of different oils —sealing qualities, the temperatures to which they will be submitted, viscosity, freedom from water, behaviour of the several hydrocarbon compounds found in blended lubricants, and tendencies toward sludge formation by impurities or chemical breakdown.
3. Danger of excess oil and methods for reclaiming and purifying it.
4. Location of oil traps for removing oil picked up by refrigerants leaving the condenser.
5. Relative efficiencies of force-feed and splash systems.
6. Different lubrication requirements of horizontal, vertical, and rotary type compressors.

Best oil for each unit, the booklet indicates, can be chosen only after consideration of all factors.

General principles of refrigeration are considered in the discussion, and 29 photographs and diagrams of many better-known makes of compressors are included.

CORRECTION

Illustrations Mixed in Article on Fittings

An error was made in placing part of the illustrations for the article, "Fittings for Adapting Actual O.D. Size Copper Tubing to Nominal Size Tubing," which was published on pages 20 and 21 of the July 7 issue of AIR CONDITIONING AND REFRIGERATION NEWS.

The error was made in placing the drawings, Figs. 1 and 3. The drawing in Fig. 1 should have exchanged places with the drawing in Fig. 3, the heading remaining the same as it appeared in the issue.

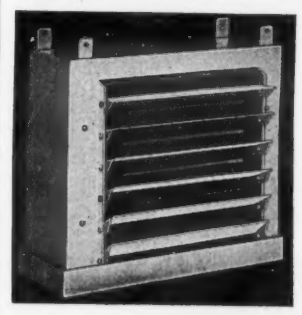
Mercoid Announces 3 Personnel Changes

CHICAGO—Three shifts in personnel were announced last week by the Mercoid Corp., manufacturer of automatic controls and mercury controls and switches.

Bassett Lerch has been transferred from the factory office and sales department here to St. Louis; Russell McDonald has been assigned to the Boston office, and Paul J. Provost has been transferred to the Philadelphia office from company headquarters here.

Sales of Mercoid products for the first six months of 1937 are more than 50% above those for the same period of last year.

THE BUYER'S GUIDE



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Vol. 11—Jan. 3 to April 25, 1934. (Serial Nos. 250 to 266.)
Vol. 12—May 2 to Aug. 29, 1934. (Serial Nos. 267 to 284.)
Vol. 13—Sept. 5 to Dec. 26, 1934. (Serial Nos. 285 to 301.)
Vol. 14—Jan. 2 to April 24, 1935. (Serial Nos. 302 to 318.)
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Vol. 16—Sept. 4 to Dec. 25, 1935. (Serial Nos. 337 to 353.)
Vol. 17—Jan. 1 to April 29, 1936. (Serial Nos. 354 to 371.)
Vol. 18—May 6 to Aug. 26, 1936. (Serial Nos. 372 to 388.)
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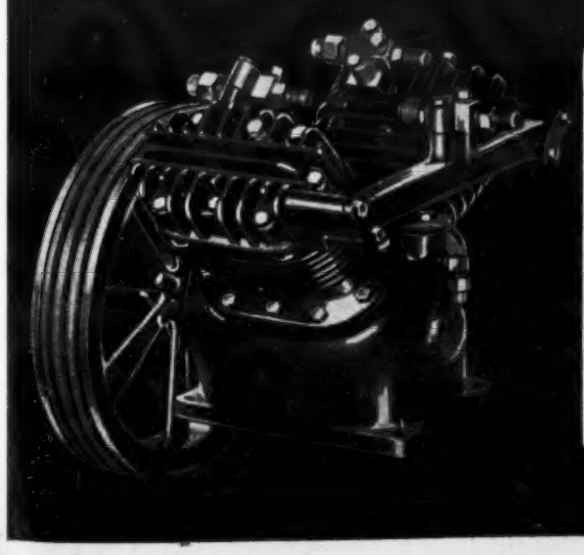

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PAR Refrigeration Compressors are made in six sizes. Models R25—R50—R100 are two cylinder pumps and are recommended for use on highsides from ¼ to 1 horse power. Models R200—R500—R1000 are four cylinder V type construction and are recommended for use on highsides from 1½ to 10 horsepower.

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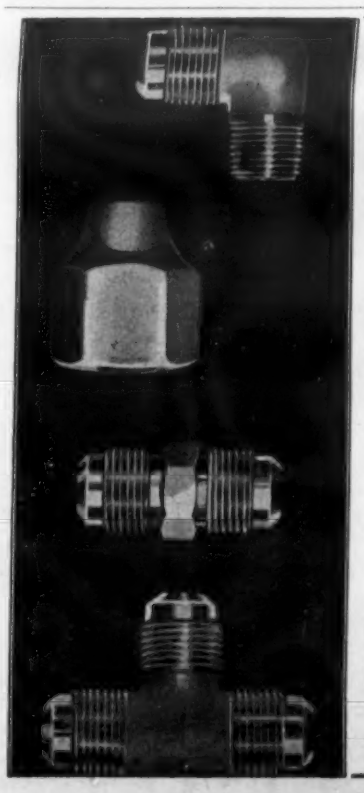

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Ferro Builds Record Porcelain Furnace for Norge

CLEVELAND—What is claimed to be the largest continuous porcelain enameling furnace in the world has been completed by Ferro Enamel Corp. for Norge Corp., Muskegon, Mich.

Crosley-Buffalo Forge Dealer Opens in Shreveport, La.

SHREVEPORT, La.—Featuring a full line of Crosley refrigerators, Buffalo Forge "Breeze Air" attic ventilators, and Diehl fans, Cahn Electric Co., Inc. recently opened a new store at 708 Milam St.

2 Men Added to Apex National Sales Staff

CLEVELAND—Addition of H. F. Costello and Donald D. Napier to the sales staff of Apex Electrical Mfg. Co. was announced last week by Charles W. Smith, general sales manager of the company.

Mr. Costello will do special sales work in the east under J. M. Michael, Apex eastern division manager.

Mr. Napier has been named district manager for Apex in the Minneapolis-St. Paul territory, as successor to Scott C. Rexinger, who has been promoted to the company's Chicago office.

Comparing Methyl Chloride And Other Gases in Terms Of a 'Perfect' Refrigerant

(Editor's Note: This is Part 2 of some extracts from the paper "Methyl Chloride—A Practical Refrigerant Measured by the Theoretical Ideal," delivered by E. W. McGovern of the R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co., Inc. at the recent convention of the American Society of Refrigerating Engineers.)

LUBRICATING PROPERTIES OF REFRIGERANT

An ideal refrigerant would itself possess high lubricating value. This would not necessarily allow elimination of the usual lubricants of low volatility such as mineral oils since the present machine designs generally call for compression of vapors with more or less initial superheat and liquid refrigerant is not present at most points where lubrication is needed.

However, lubricating value in a refrigerant is valuable if oils are seriously diluted by refrigerant. Of the common refrigerants, only sulphur dioxide is claimed to possess any important degree of lubricating value.

REACTION WITH LUBRICANT

A refrigerant should show no harmful reaction with lubricant even in the presence of water.

There is no known reaction between methyl chloride and mineral oils or glycerine. There is a possibility that methyl chloride may add to any bad effects of moisture on oils because of hydrochloric acid formed, although there is no evidence to this effect.

What is said of methyl chloride and oils is true of other halogenated hydrocarbon refrigerants and probably methyl formate. Unsubstituted hydrocarbon refrigerants and carbon dioxide do not react with oils. Ammonia has little or no effect on mineral oils but in the presence of water may produce emulsification or may present some reaction especially if saponifiable oils are present.

Ordinary oils may react with sulphur dioxide and specially refined oils must be used. There may be reaction of sulphur dioxide at high (tropical) temperatures with oils satisfactory at ordinary temperatures.

SOLUBILITY OF REFRIGERANT IN LUBRICANT

The ideal refrigerant would not be so soluble in lubricant under operating conditions that good lubrication could not be provided and that excessive oil foaming (due to boiling off of refrigerant) or that oil pumping introduced difficult design problems; boiling refrigerant in flooded evaporators would return oil with exit gas as a fog thus avoiding oil accumulation (oil logging) and making it unnecessary to select refrigerants of limited mutual solubilities so as to provide for return of oil to compressor by actual separation from refrigerant.

Boiling point of refrigerant-oil mixtures would be close to boiling point of pure refrigerant and there would be no tendency to superheat; density of refrigerant would be the same as that of lubricant so that oil refrigerant solutions of varying composition would not adversely affect float valve operation.

Disadvantages of oil soluble refrigerants can be eliminated or minimized by proper machine construction and also by selection of a refrigerant which, while completely miscible with oil at refrigerant saturation pressures and temperatures, exhibits low solubility of gas in oil under crankcase pressures and temperatures.

The percent by weight of methyl chloride gas which dissolves in oil at the usually encountered temperatures and pressures is not excessive—for example about 16% at 80° F., 40 lb./in.² gauge. Freon-12 solubility at the same temperature and pressure is about 27% by weight.

Under the same operating temperatures, pressures of Freon-12 are somewhat higher than those of methyl chloride, and solubilities increase with pressure.

Boiling point rise caused by oil in evaporators is very low with both refrigerants as long as oil is not present in abnormally high percentages.

Other refrigerants showing complete miscibility with oil include all hydrocarbons and halogenated hydrocarbons. Some operate at lower pressures than methyl chloride and Freon-12 and, therefore, tend to show lower gas solubilities under operating conditions.

Carbon dioxide, ammonia, and sulphur dioxide show limited miscibility with oil. However, they dissolve to some extent and, therefore, present to some degree many of the effects of miscible refrigerants.

SOLUBILITY OF ICE

The ideal refrigerant with moisture present, would not precipitate ice when cooled since interruption of refrigeration or faulty operation occurs when ice lodges in expansion valves, evaporators, and tubing.

Actually, however, due to other objections to the presence of water, especially corrosive effects, separation of ice is an advantage in giving warning of presence of water before greater damage results.

Extremely small percentages of water do not freeze out and cause trouble in methyl chloride machines as the solubility is about 0.026% by weight at —11.6° F. and about 0.25% at 32° F.

Solubility of water in all hydrocarbon and halogenated hydrocarbon refrigerants is low. Freon-12 dissolves only 0.006% by weight water at 32° F. Freeze ups are less likely or do not occur with most other refrigerants.

LIFE AND HEALTH HAZARD-TOXICITY

The theoretical ideal refrigerant would not be a potential danger to life or health under any conditions. It would not in itself be toxic or asphyxiating in any concentration, it would not form toxic or asphyxiating decomposition or combustion products, it would not operate under or build up high pressures so as to tend to escape confinement with explosive force, it would be non-irritant so as to present no public hazard in case of leakage and would present no fire or explosion hazard.

There is no substance known which meets all of these requirements perfectly although air and even more so water come very close to it.

Higher concentrations of methyl chloride present serious hazards to life and health but by proper application and by placing proper limitations on quantities used, the life and health hazard of this refrigerant is reduced so as to be extremely low or eliminated.

U. S. Public Health Bulletin No. 185 reports death or serious injury to guinea pigs on exposure to 15-30% by volume methyl chloride for a very short time. Underwriters Laboratories Report MH 2375 lists 2.0-2.5% for 2 hours as causing death or serious injury. Methyl chloride is non-irritant and its use would entail no public hazard.

Four pounds of methyl chloride in a 1,000-cu. ft. space is equivalent to a concentration of 3% by volume. With two air changes per hour, said to be an average condition in a room with doors and windows closed, the concentration would be reduced to 1.1% in 30 minutes and to 0.4% in one hour.

If 4 lbs. per 1,000 cu. ft. of room space were released over a period of one hour, which would be a rapid leak, the maximum concentration would be reached at the end of the hour and would equal 1.25%, assuming no local concentration. All of the data in this paragraph are based on that in an article by E. T. Williams and J. B. Churchill.

On the basis of the above, it would appear that unit systems—sealed or unsealed—containing up to 6 lbs. of methyl chloride, or larger systems containing up to 4 lbs. of methyl chloride per 1,000 cu. ft. of space exposed to refrigerant in case of leakage, up to a maximum of 50 lbs., present a high degree of safety and that methyl chloride can be so used where any other refrigerant is used with safety in quantity equal to or greater than that here mentioned.

Quite a few refrigerants, notably carbon dioxide, methylene chloride, and the Freon group, are superior to methyl chloride from the standpoint of toxicity.

Ammonia and sulphur dioxide are considerably more toxic than methyl chloride although their irritant nature provides physiological warning of their presence and, at least in most applications, makes them less hazardous than if they were non-irritant.

An irritant, acrolein, is sometimes added to methyl chloride, to provide warning power.

Direct comparison of refrigerants according to their toxicities is difficult because of the many factors making up their potential hazards from a health standpoint. One of the most important factors is percentage by volume of the gaseous refrigerant in air required to cause death or serious injury in a given time, say one hour.

Another very important factor is boiling point of the refrigerant. A refrigerant with a boiling point considerably above room temperature is incapable of building up very high concentrations unless heated. The lower the boiling point the higher the vapor pressure of such refrigerants and the higher the concentrations that may be built up.

High pressure (low boiling) refrigerants escape faster. Escaping tendency aside from the pressure factor is of some importance although minor.

Density and diffusion rate of a gas determine to some extent the tendency of the gas to concentrate near the floor levels rather than to be diluted by even diffusion throughout a room.

FIRE AND EXPLOSION HAZARD

A refrigerant should present no fire or explosion hazard. In this discussion the term "fire hazard" is not taken to include the subject of poisonous decomposition products.

(Concluded on Page 23, Column 1)

THE BUYER'S GUIDE

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How Various Refrigerants Compare When Measured in Terms of Desirable Key Properties

(*Concluded from Page 22, Column 5*)

Methyl chloride is classed by Underwriters Laboratories Report MH 1418 as moderately flammable with a moderate explosion hazard. Approximately 10 lbs. per 1,000 cu. ft. of air are required to give a concentration of 8.1% by volume, the lower explosive limit; mixtures containing less than 8.1% will not explode. The upper explosive limit is 17.2%.

Of further interest is the fact that methyl chloride in air develops a comparatively low maximum explosion pressure (69 lb./in.² with 11.49% methyl chloride starting at 68° F.) and the time for development of this maximum pressure is relatively high (0.110 sec.).

These figures show that explosion hazard is taken care of when proper limitations from a toxicity standpoint are placed on the use of methyl chloride; concentrations required to form explosive mixtures are well above the particularly dangerous toxic concentrations.

In considering explosion hazards and precautions which should be taken, attention should be paid to hazards presented by refrigerant-oil mixtures. Oils are, of course, flammable and, when present in the atmosphere as a fog, may be highly explosive unless sufficiently masked by a non-flammable gas.

Liquid receivers, crankcases, or evaporators may contain oil along with more or less refrigerant and a leak, especially a high-pressure leak, followed by partial evaporation of the refrigerant content, may result in the formation of an explosive oil fog.

ODOR-IRRITANT EFFECT

A refrigerant, viewed only from the standpoint of panic hazard, convenience in servicing, and comfort of others who may be exposed to the gas should be non-irritant and odorless, or should at the most have a pleasant but non-lingering odor. If a refrigerant presents hazards or if warning of leakage is desirable, an irritant effect or strong odor may be desirable.

Methyl chloride is non-irritant and has only a faintly sweet odor. 1% acrolein is sometimes added as a warning agent and the mixture is then highly irritant, about 0.1% by volume of the mixture irritating the mucous membranes of the eyes and nose.

Ammonia and sulphur dioxide are strong irritants. Methyl formate is said to give adequate warning of its presence. The rest of the commonly used refrigerants are odorless or almost odorless, except in high concentrations, and are essentially non-irritant.

EFFECT ON FOODS, FURS, FLOWERS, TEXTILES, ETC.

Refrigerants should not physically harm or poison substances with which they may come in contact in case of escape of the gas.

Tests have shown that methyl chloride vapors do not harm furs, flowers, textiles, and other household articles. Experiments described in Public Health Report, Vol. 45, No. 19 indicates that there is no particular danger in eating foods or drinking beverages that have been exposed to methyl chloride vapors.

Hydrocarbon and halogenated hydrocarbon refrigerants do not harm furs, flowers, and textiles and probably would not seriously poison foods. Carbon dioxide is harmless in these respects.

Sulphur dioxide is a strong bleach and is corrosive in the presence of moisture. Ammonia in higher concentrations and especially in the presence of water, could damage flowers, certain dyed materials, and corrode copper.

LEAKAGE TENDENCY

Rate of leakage depends upon refrigerant properties of pressure difference, viscosity and density, as well as diffusion factors including molecular weight. Diffusion through oil film on seal surfaces may be important especially where solubility of refrigerant in oil is high and where pressure of refrigerant on seal is greater than atmospheric.

Experimental data on leakage tendencies of various refrigerants under operating conditions are not available. Actual experience has shown methyl chloride to have a relatively low leakage tendency when compared to other refrigerants operating at positive low side pressures. Modern seals, replacing the old stuffing boxes, have satisfactorily solved the seal problem with methyl chloride.

DETECTION AND LOCATION OF LEAKS

Refrigerant leaks should be capable of being easily detected and located.

Methyl chloride leaks are not as easy to locate as are leaks of some other refrigerants. No satisfactory fog test such as is used with ammonia and sulphur dioxide is available.

Leaks of methyl chloride are best detected and located by placing the unit under refrigerant, air, or nitrogen pressure and applying soap solution to suspected points. Oil spots also enable detection and location of leaks as methyl chloride in all parts of the system carries more or less oil.

Table 7—Toxic Properties of Gases

Refrigerant	Underwriters Laboratories Class	Kills or Produces Serious Injury % by Volume	Poisonous Decomp. Products	Boiling Point, °F.	Sp. Gr. Gas* (Air=1) 0° C., 760 mm.
Ammonia	2	0.5%-0.6% (½ hr.)	...	— 28.0	0.59
Carbon dioxide	5	29-30 (½ hr.)	No	—108.4	1.52
Dichlorethylene	4	2-2.5 (2 hr.)	Yes	118	3.35
Freon-12	6	Above 30% (2 hr.)	Yes	— 21.7	4.18
Freon-114	6	Slightly more toxic than F-12 on volume basis, same on weight basis	Yes	38.4	5.90
Ethyl chloride	4-5	6-10 (½-1 hr.)	Yes	54.5	2.23
Methyl chloride	4	2-2.5 (2 hr.)	Yes	— 10.6	1.74
Methyl formate	3	2-2.5 (1 hr.)	...	89.2	2.07
Methylene chloride	4-5	5.1-5.3 (½ hr.)	Yes	103.6	2.93
Freon-11	5	Above 10% for 2 hr.	Yes	117.9	4.74
Sulphur dioxide	1	0.7 (5 min.)	...	14.0	2.21
Freon-21	4-5	10.2 (½ hr.)	Yes	48.0	3.56
Butane	5	.....	...	33.1	2.01

*Underwriters Laboratories Report MH 1418 states "density (about twice that of air) and relative rate of diffusion of methyl chloride (less than that of air) are considered not to contribute particularly to the hazard." This statement is made in speaking of fire hazard but the same should apply to health hazard.

Table 8—Explosive Properties

Refrigerant	Explosive Limit, in Air % by Volume	Max. Explosion Pressure lb./sq. in. ga.	Time of Development of Pressure
Ammonia	16-25	50	0.175 sec.
Carbon dioxide	Non-flammable		
Dichlorethylene	5.6-11.4	76	0.095 sec.
Freon-12	Non-flammable		
Freon-114	Non-flammable		
Ethyl chloride	3.7-12.0	87	0.028 sec.
Methyl chloride	8.1-17.2	69	0.110 sec.
Methyl formate	4.5-20	96	0.026 sec.
Methylene chloride	Non-flammable		
Freon-113	Non-flammable		
Sulphur dioxide	Non-flammable		
Freon-21	Non-flammable		
	1.6-6.5	105	0.027 sec.

Effective Temperature Measuring Device Put on Market

NEW YORK CITY — The "Therhumiter," a device which is said to combine air temperature, relative humidity, and air movement into a single unit to show effective temperature, has recently been placed on the market by John R. Parsons, consulting physicist.

Use of the device is said to permit effective temperature to be measured as conveniently as is time. It has no moving parts, and is said to be without need of adjustment.

In the determination of actual atmospheric conditions the "Therhumiter" is said by its designer to handle the functions of the ordinary thermometer, the humidity indicator, the sling psychrometer, the psychrometric chart, slide rule, comfort chart, and animometer.

Results are read directly from the instrument, without reference to any chart or index. List price is $15.

5 Commercial Jobs for Austin York Dealer

AUSTIN, Tex.—Five commercial and three domestic air-conditioning installations are being made here by Whitten Sales Corp., York distributor.

Largest of the current jobs is the installation of a 40-ton, $15,000 Freon system in American National bank. Directors of the bank were so well satisfied with their offices, which were conditioned by the Whitten company a year ago, that they made arrangements for conditioning the entire building.

A 15-ton Freon system will be installed in the Renfro drug store at an approximate cost of $5,000. It is said that this system will cool the store even though the doors are left open.

Among other stores being conditioned are National Shirt Shops, Inc., Julian Millinery Shop, and Leon's Slipper Shop. Also being conditioned are the homes of Clarence Covert, E. R. L. Wroe, and J. B. Stroburg.

Mayo to Distribute G-E Conditioning in Detroit

DETROIT—Mayo, Inc. has been appointed distributor in this territory for General Electric Co.'s full line of cooking, automatic heating, and air-conditioning equipment, according to W. N. Mayo, president.

The firm also will offer engineering counsel to architects and builders, and will maintain a staff for installation work.

J. A. Leonard, Jr. is associated with Mr. Mayo, but other officers of the distributorship have not been announced.

Harrigan & Reid, plumbing and heating contractor, was the previous distributor.

Boulder, Col., Contractor Air Conditions Elks' Game Room

BOULDER, Col.—Air-conditioning equipment has been installed in the game room of the Elks club here by City Plumbing & Heating Co., local contracting firm. Included in the equipment are two exhaust fans, each with a capacity of 38,000 c.f.m.

Airtemp Equipment Installed In Lexington, Ky., Hotel

LEXINGTON, Ky. — Temperature Sales Co. has installed Airtemp air-conditioning equipment in the coffee shop of the New Phoenix hotel here. W. M. Wallace supervised the job.

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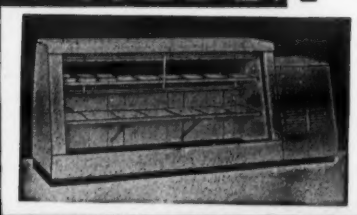
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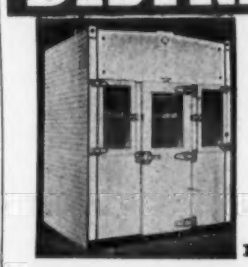
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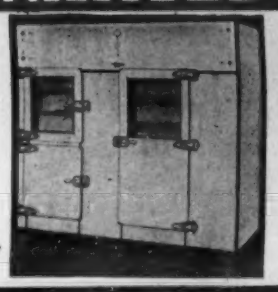
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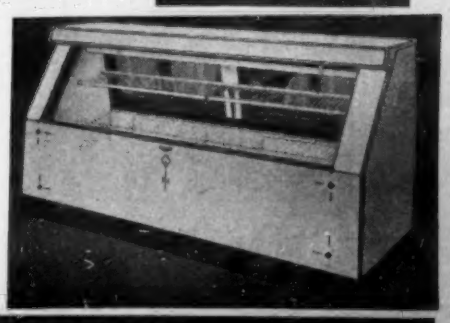
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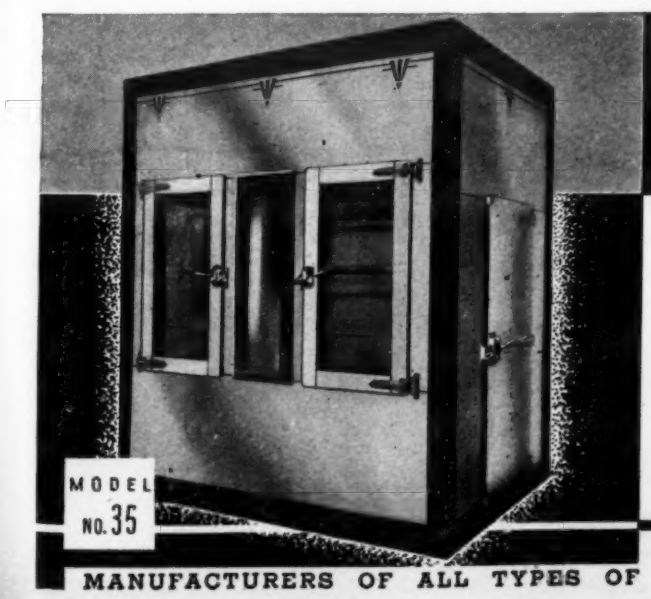

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